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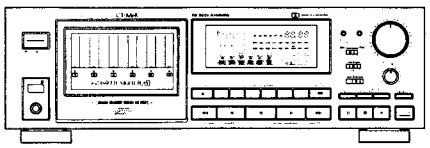
Service Manual



ORDER NO.
ARP1890

MULTI-CASSETTE CHANGER

CT-M6R

● This manual is applicable to the KUC type.

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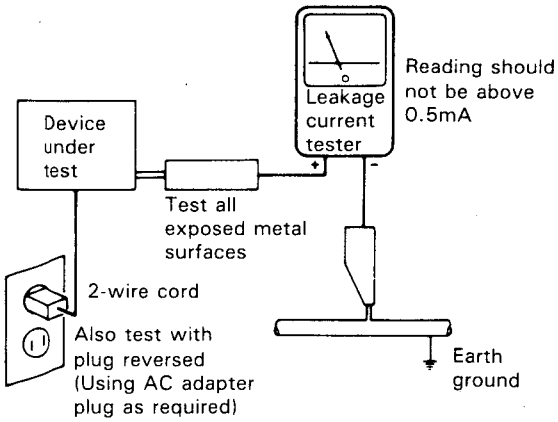
1. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Leakage current tester
Reading should not be above 0.5mA
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

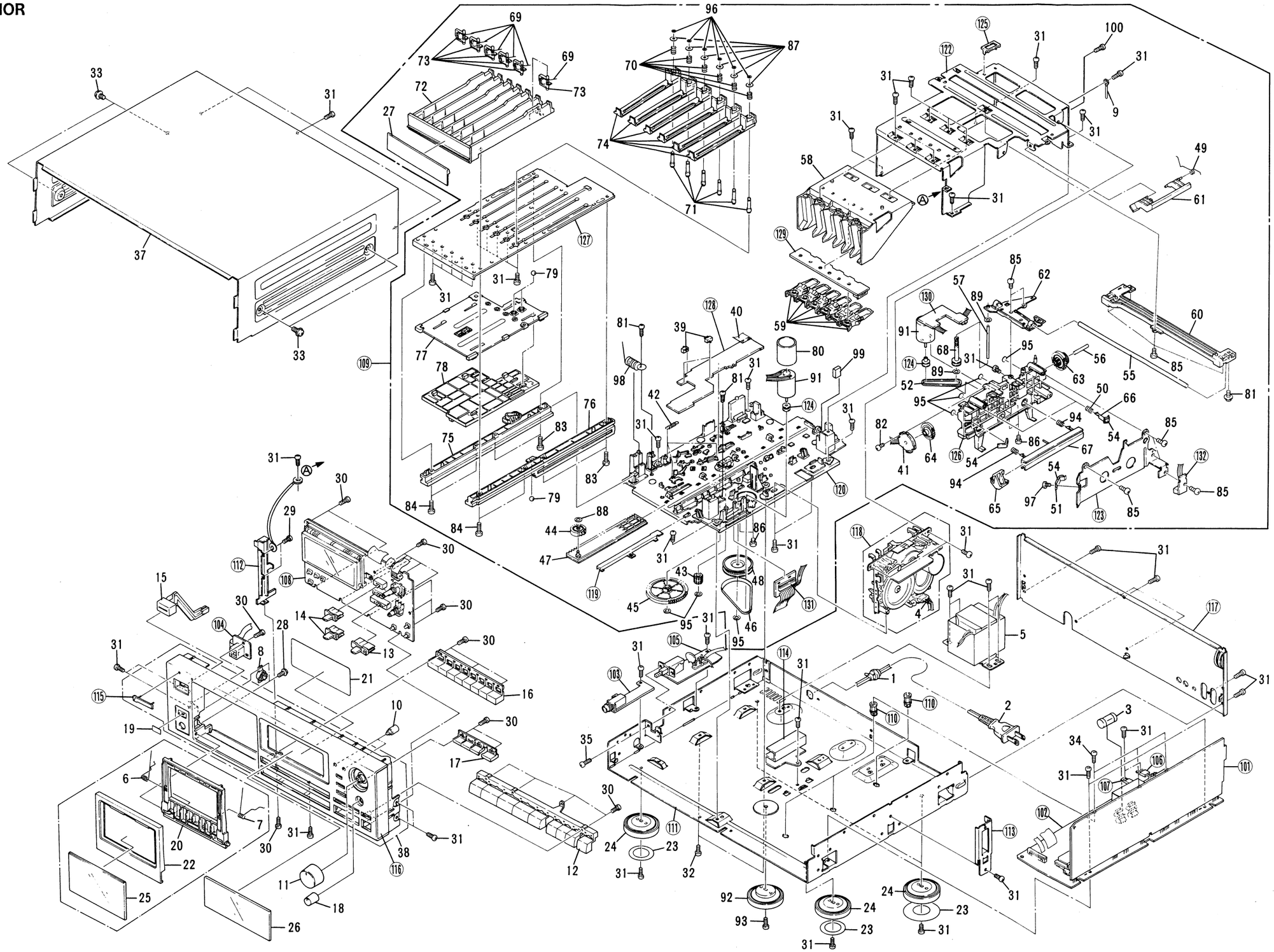
Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or a additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

2. EXPLODED VIEWS AND PARTS LIST

2.1 EXTERIOR



NOTES :
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the impotance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

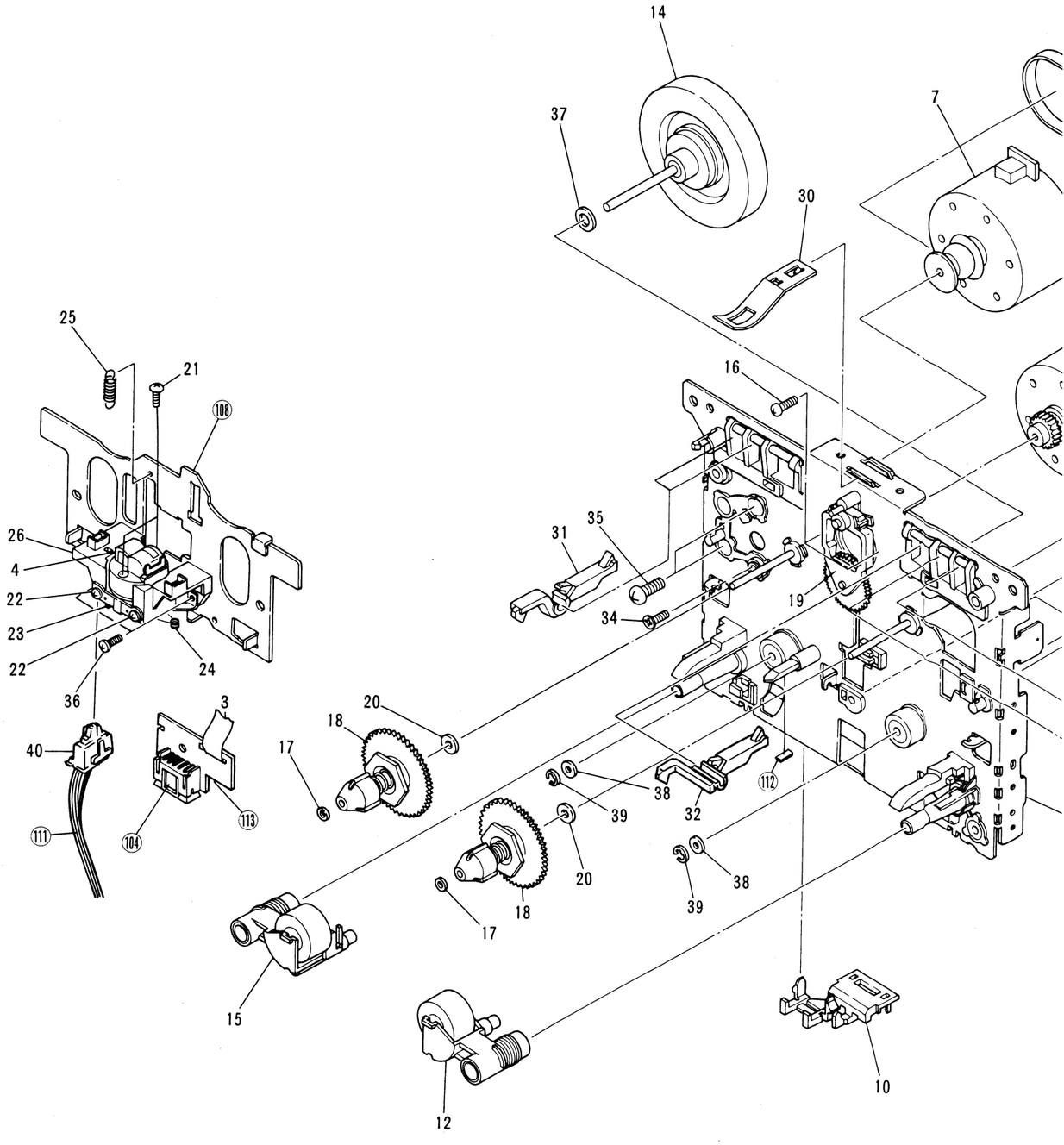
Parts List of Exterior

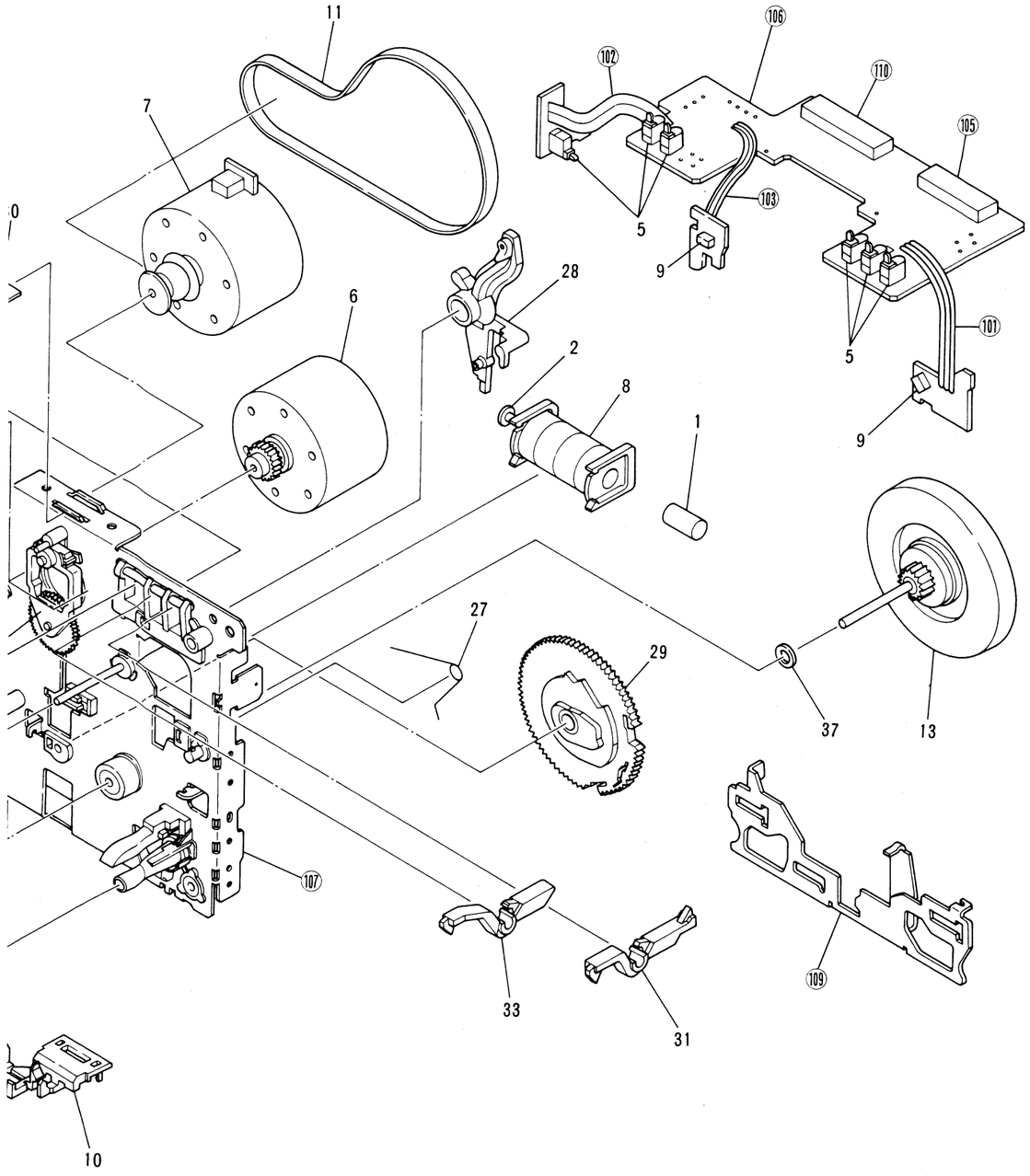
Mark	No.	Part No.	Description
⚠	1	CM−22C	Strain relief
⚠	2	PDG1015	Power cord
⚠	3	REK1001	FU501, FU502 Fuse (1.5A)
	4	RKP1350	Connector assembly 5P
⚠	5	RTT1115	T1 Power transformer
	6	RBH1241	Door spring (L)
	7	RBH1242	Door spring (R)
	8	REC1005	Damper assembly
	9	RNH−184	Cord clamper
	10	RAA1014	Counter reset button
	11	RAC1363	VR knob
	12	RAC1456	Operation button
	13	RAC1457	Slide knob (A)
	14	RAC1458	Slide knob
	15	RAC1459	Power button
	16	RAC1460	Tact button (A)
	17	RAC1461	Tact button (B)
	18	RAC1462	VR knob (B)
	19	RAH1571	Remote control panel
	20	RNK1544	Door
	21	RNK1545	FL filter
	22	RNK1547	Door cover
	23	VEC1061	Stopper
	24	VNK1095	Insulator
	25	RAH1569	Door lens
	26	RAH1570	FL lens
	27	RNK1548	Tray plate
	28	ARZ26P060FMC	Screw
	29	BBZ26P060FMC	Screw
	30	BBZ26P080FZK	Screw
	31	BBZ30P080FMC	Screw
	32	BBZ30P120FMC	Screw
	33	FBT40P080FZK	Screw
	34	IBZ30P150FCU	Screw
	35	PMA30P060FMC	Screw
	36	REC−371	Binder
	37	RXX1250	Bonnet
	38	RXX1251	Front panel assembly
	39	PSH1003	Slide switch
	40	RDD1185	Lead card 10p
	41	RXA1323	Encoder assembly
	42	RBH1243	Switch spring
	43	RNK1551	Drive gear (A)
	44	RNK1552	Drive gear (B)
	45	RNK1553	Interval gear
	46	REB1127	O/C belt
	47	RNK1606	Rack plate
	48	RNK1604	Pulley gear
	49	RBH1244	Reset lever spring
	50	RBH1247	Cassette pressure spring
	51	RBK1033	Cassette hold spring
	52	REB1120	Drive belt
	53	RED1024	Carrier felt
	54	RED1025	Pressure felt
	55	RLA1137	Guide shaft
	56	RLA1140	Loading shaft
	57	RLA1141	Worm shaft
	58	RNK1558	Upper holder
	59	RNK1560	Cassette arm
	60	RNK1561	Upper rack
	61	RNK1562	Reset lever
	62	RNK1573	Carrier slider
	63	RNK1576	Loading gear
	64	RNK1577	Encoder gear
	65	RNK1578	Selector
	66	RNK1579	Cassette pressure (A)
	67	RNK1580	Cassette pressure (B)
	68	RXA1319	Worm pulley assembly
	69	RBH1245	Stopper arm spring
	70	RBH1246	Stopper pin spring
	71	RLA1138	Stopper pin
	72	RNK1564	Tray
	73	RNK1565	Stopper arm
	74	RNK1567	Cassette holder
	75	RNK1568	Side rail (L)
	76	RNK1569	Side rail (R)
	77	RNK1570	Drive plate (A)
	78	RNK1571	Drive plate (B)
	79	PBP−007	Steel ball ϕ 5
	80	RNE1373	Shield band
	81	ABZ30P080FMC	Screw
	82	BPZ20Y060FMC	Screw
	83	BBZ26P100FMC	Screw
	84	BBZ26P140FZK	Screw
	85	BBZ30P060FZK	Screw
	86	PMZ30P040FMC	Screw
	87	WA21D085D025	Washer
	88	WT21D050D050	Washer
	89	WA26D047D050	Washer
	90	.....	.....
	91	RXX1253	Motor assembly
	92	PNW1376	Insulator
	93	BBZ30P100FMC	Screw
	94	RBH1256	Cassette pressure spring 2
	95	WT26D047D050	Washer
	96	WT17D034D050	Washer
	97	BBZ20P040FMC	Screw
	98	RBH1261	Earth spring
	99	REB1129	Tray stopper
	100	ABZ30P150FMC	Screw
	101		Amp unit
	102		Control unit
	103		HP. jack unit
	104		Remo−con unit
	105		Power switch unit
	106		Transistor A unit
	107		Transistor B unit
	108		Sub unit
	109		Loading unit
	110		PCB spacer
	111		Main chassis
	112		Door holder
	113		PCB holder
	114		Shield plate (A)
	115		Name plate
	116		Front panel
	117		Rear panel
	118		Mechanism unit
	119		Load plate
	120		Bottom chassis
	121		.....
	122		Upper chassis
	123		Carrier plate
	124		Motor pulley
	125		Lead holder
	126		Carrier assembly
	127		Tray base
	128		Bottom unit
	129		Upper unit
	130		Carrier unit
	131		Connector unit
	132		Switch unit

Parts List of Mechanism Unit

Mark	No.	Part No.	Description
	1	RLA1130	Shaft
	2	RLA1132	Planger
	3	RNP1232	HD FPC (R/P)
	4	RPB1030	R/P, E head
	5	RSG1018	Push switch
	6	RXM1029	Motor assembly
	7	RXM1032	Motor assembly (Main)
	8	RXP1010	Solenoid
	9	SPI-335-34-C	Photo transistor
	10	RNK1530	Wire holder
	11	REB1112	Main belt
	12	RXA1183	Pinch roller assembly
	13	RXA1294	Flywheel assembly
	14	RXA1295	Flywheel assembly
	15	RXA1296	Pinch roller (L) assembly
	16	RBA1076	Screw
	17	RBF-057	Washer
	18	RXA1184	TU Reel assembly
	19	RXA1248	Idler assembly
	20	WA21D070D013	Washer
	21	PMZ14P050FNI	Screw
	22	RBA1080	Azimuth screw
	23	RBK1029	Azimuth spring
	24	RBL-085	Rotation spring
	25	RBL1003	Head base spring
	26	RXA1293	Head housing assembly
	27	RBH1239	Slide spring
	28	RNK1525	Play arm
	29	RNK1526	Cam gear
	30	RBK1031	Cassette hold spring
	31	RNK1527	REC detection lever
	32	RNK1537	Metal detection lever (R)
	33	RNK1543	Pack detection lever (P)
	34	PBZ30P080FMC	Screw
	35	PMZ26P050FMC	Screw
	36	RBA1077	Screw
	37	WA26D045D025	Washer
	38	WA26D047D050	Washer
	39	YE15FUC	Washer
	40	SPI-320-AB	Quick sensor
	101		Triple-conductor jumper wire
	102		Dual-conductor jumper wire
	103		Jumper wire
	104		Connector (5P)
	105		Connector (8P)
	106		P.C. board
	107		Chassis assembly
	108		Head base
	109		Slide plate
	110		Connector (12P)
	111		QS jumper wire
	112		Reflection plate
	113		Head P.C.B R/P

2.2 MECHANISM UNIT

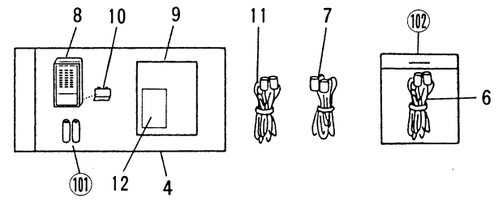


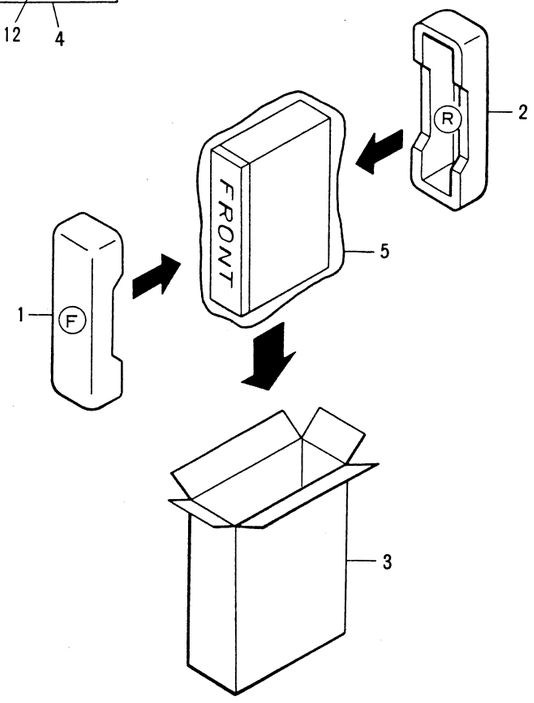


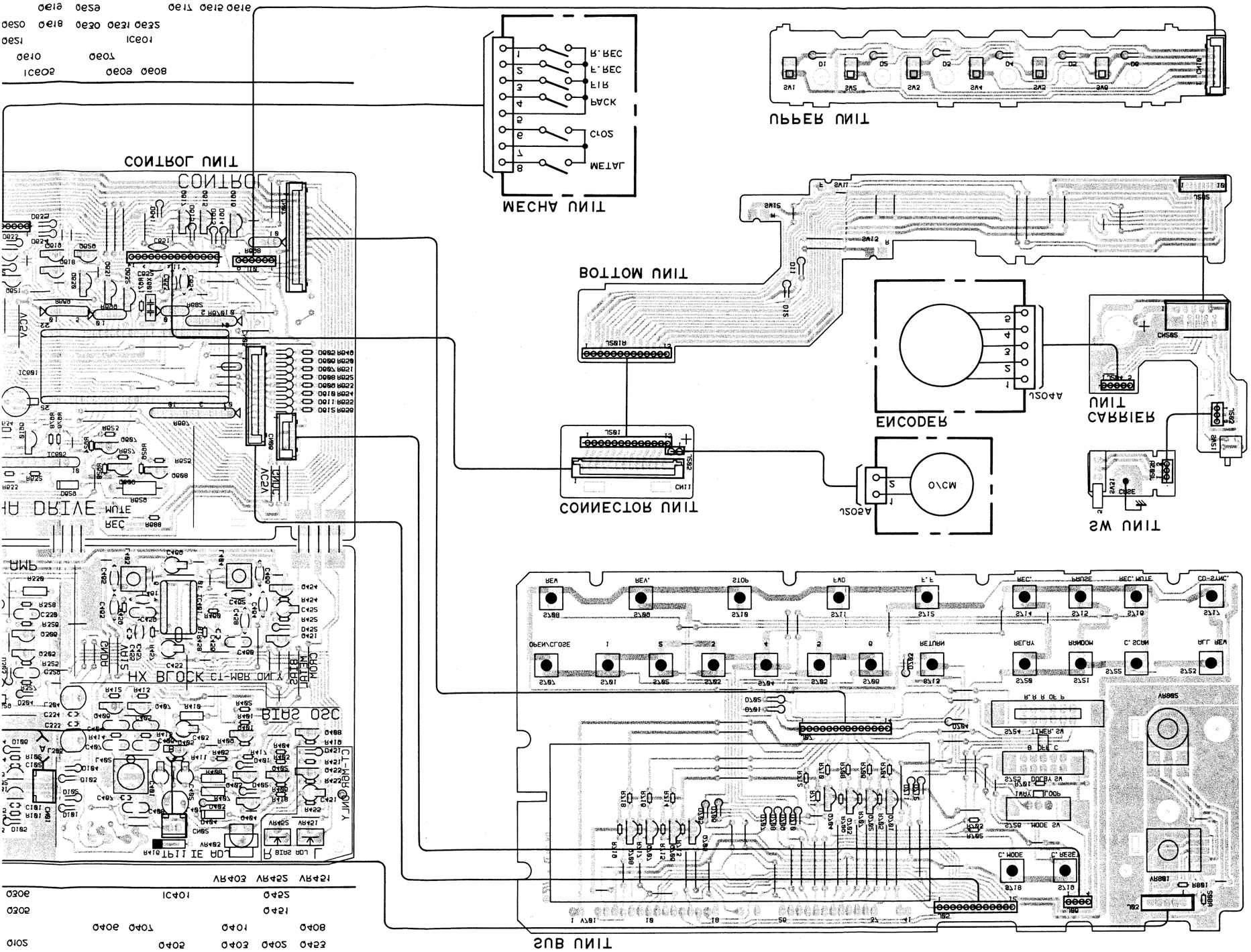
3. PACKING

Parts List

Mark	No.	Part No.	Description
	1	RHA1044	Pad (F)
	2	RHA1045	Pad (R)
	3	RHG1152	Packing case
	4	RHL1001	Plustic bag
	5	RHX−034	Sheet
	6	PDE−319	Connection cord (Mini−plug)
	7	RDE1018	Control cord
	8	RPX1035	Remote control unit
	9	RRB1054	Operating instructions (English)
	10	VNK−634	Case (C)
	11	RDE−010	Connection cord
	12	RRW1065	Title seal
B	101		Battery
	102		Connection cord assembly

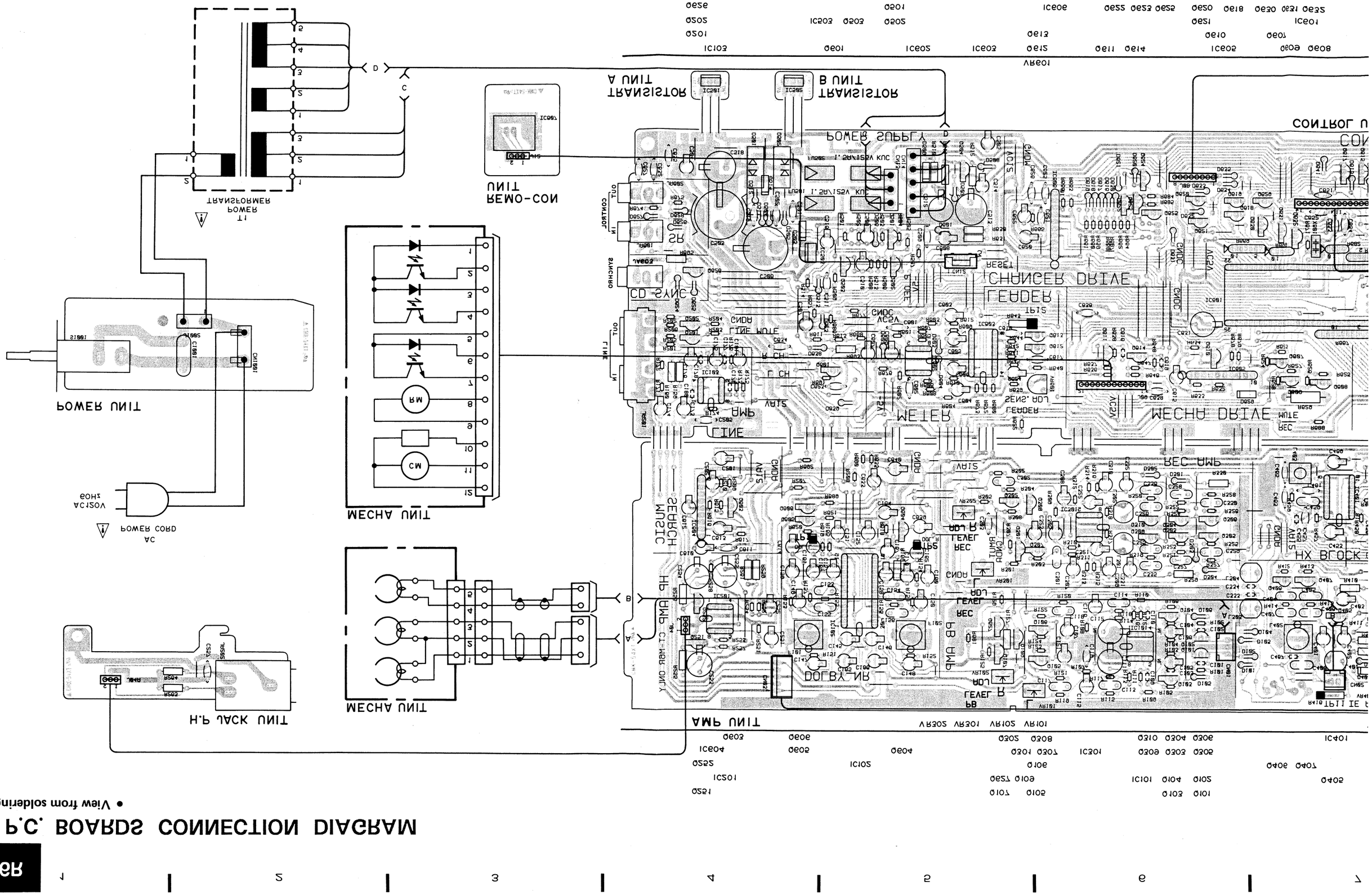





CONTROL UNIT
MECHA UNIT
R.REC
F.REC
FIR
PACK
CTOS
METAL
UPPER UNIT
BOTTOM UNIT
ENCODER
CARRIER UNIT
WS UNIT
CONNECTOR UNIT
SUB UNIT
HX BLOCK
AC24V
DC12V
DC5V
REC
WRITE
HEAD DRIVE

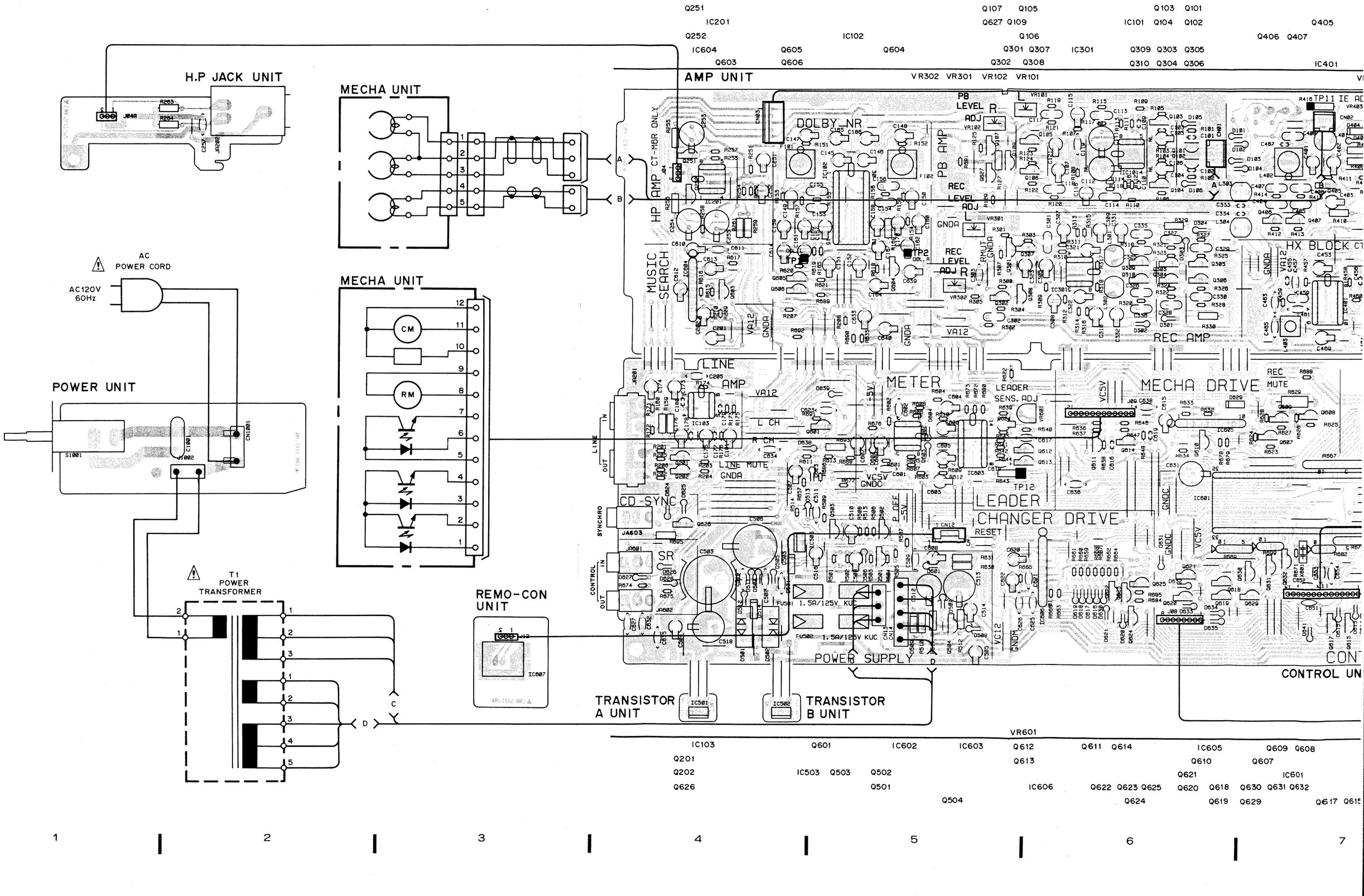
A. P.C. BOARDS CONNECTION DIAGRAM

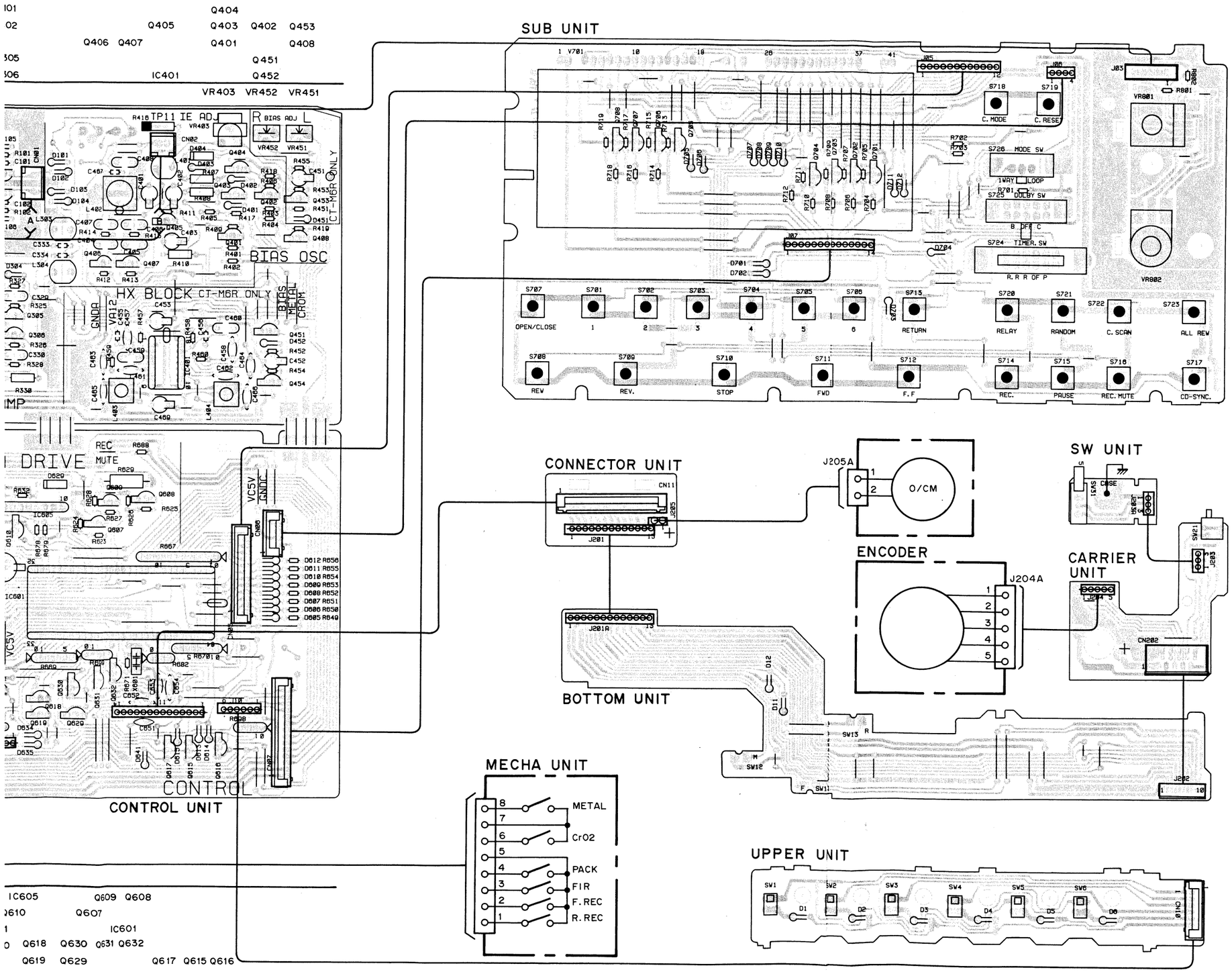
• View from soldering side



4. P.C. BOARDS CONNECTION DIAGRAM

- View from component side

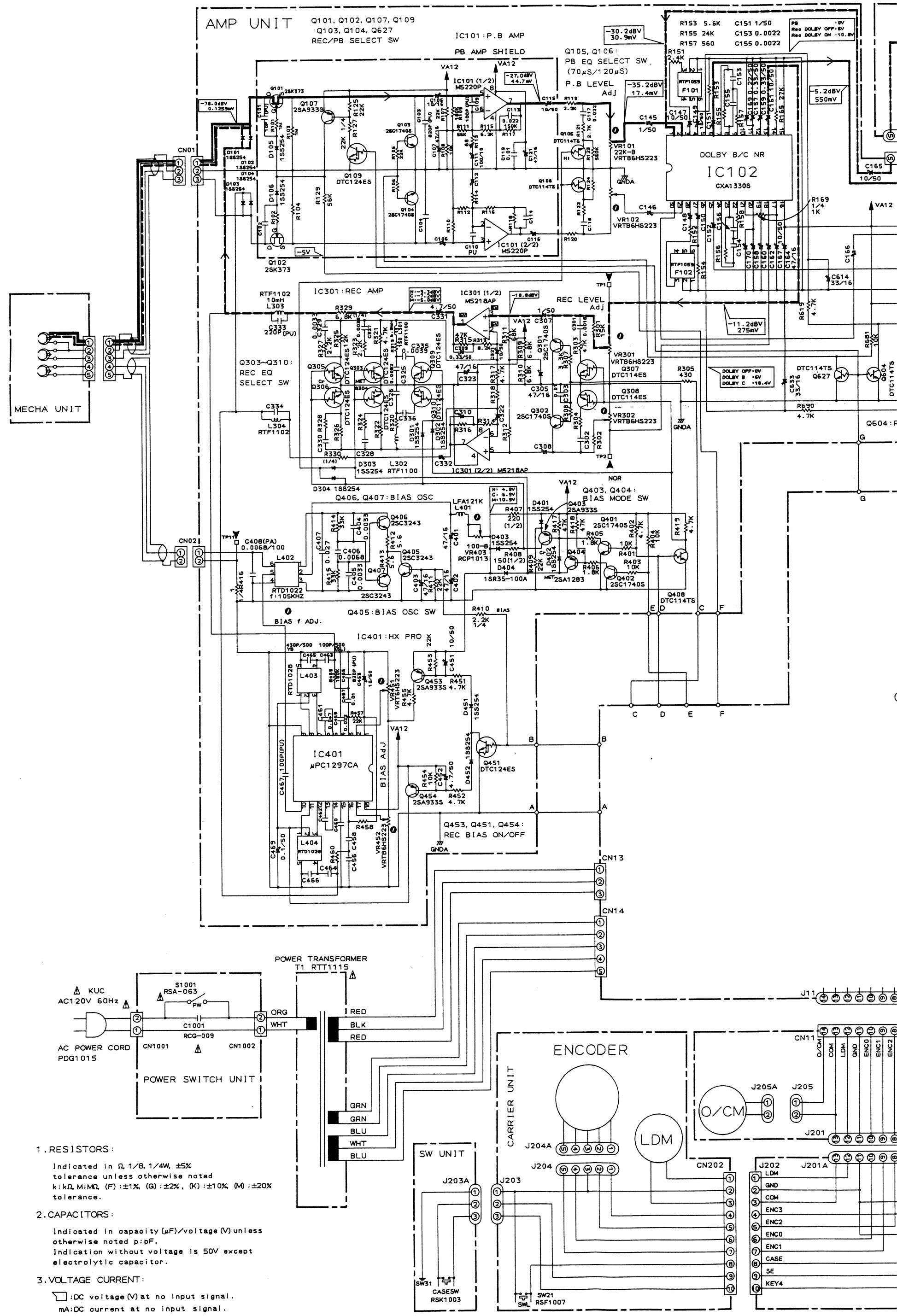


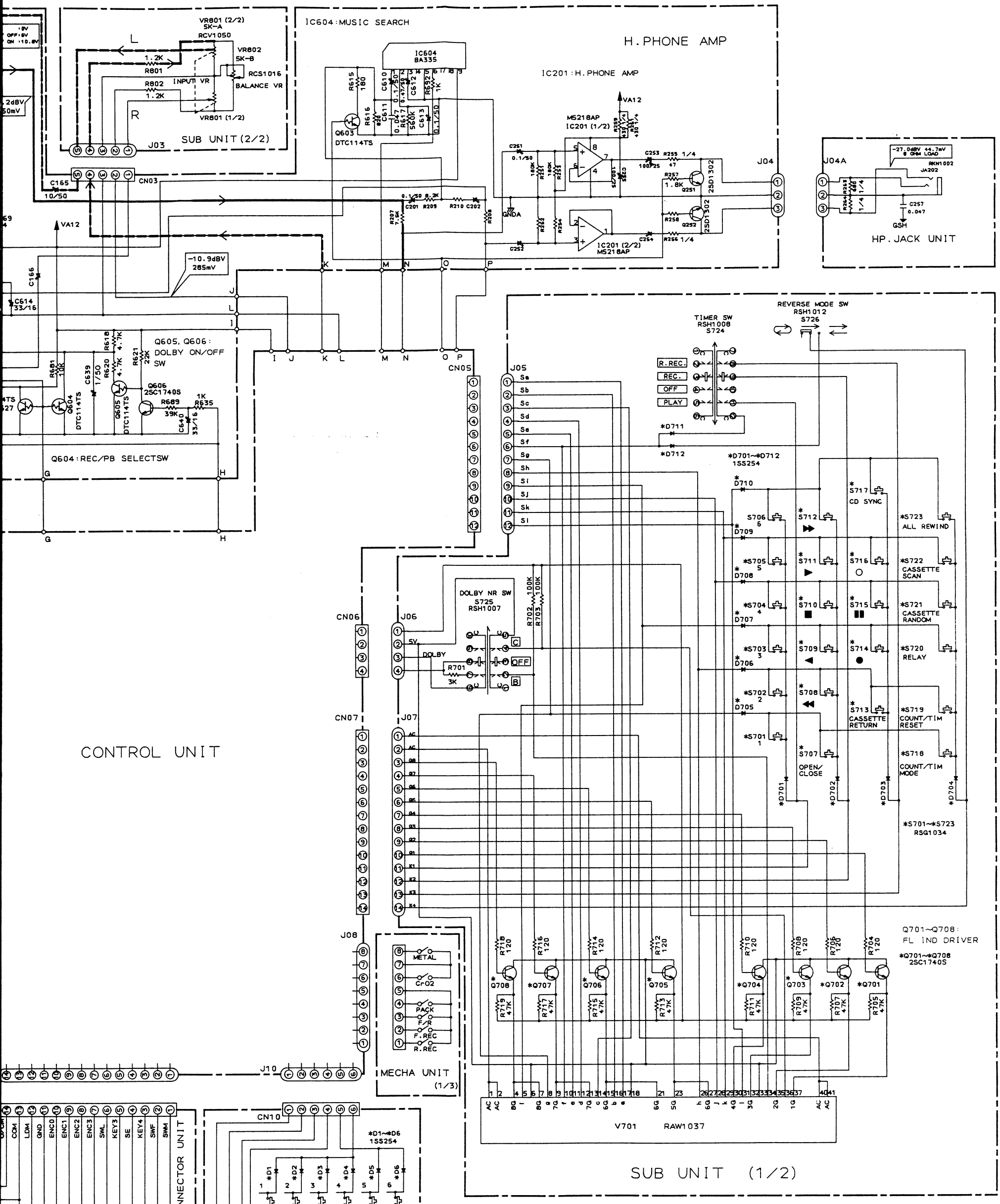


P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor
		FET
		Diode
		Zenner diode
		LED
		Varactor
		Tact switch
		Inductor
		Coil
		Transformer
		Filter
		Ceramic capacitor
		Mylar capacitor
		Styrol capacitor
		Electrolytic capacitor (Non polarized)
		Electrolytic capacitor (Noiseless)
		Electrolytic capacitor (Polarized)
		Electrolytic capacitor (Polarized)
		Power capacitor
		Semi-fixed resistor
		Resistor array
		Resistor
		Resonator
		Thermistor

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

5. SCHEMATIC DIAGRAM





CONTROL UNIT

4. SWITCHES (The underline indicates the switch position)

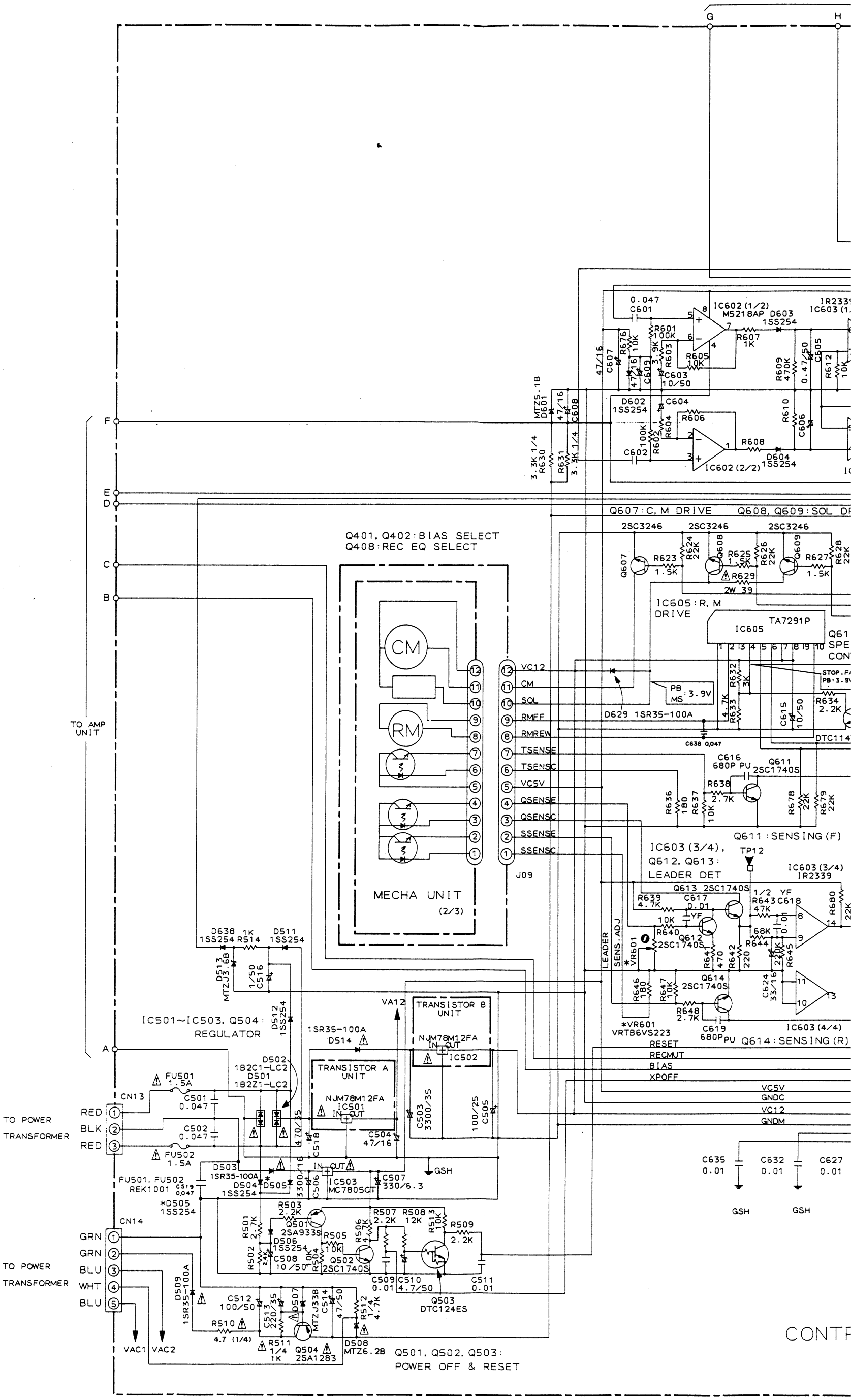
S1001 : ON–OFF
S701 : 1
S702 : 2
S703 : 3
S704 : 4
S705 : 5
S706 : 6
S707 : OPEN/CLOSE
S708 : ◀◀
S709 : ◀
S710 : ■
S711 : ▶
S712 : ▶▶
S713 : CASSETTE RETURN
S714 : ●
S715 : ▮▮
S716 : ○
S717 : CD SYNCHRO
S718 : COUNTER/TIMER MODE
S719 : COUNTER/TIMER RESET
S720 : RELAY
S721 : CASSETTE RANDOM
S722 : CASSETTE SCAN
S723 : ALL REWIND
S724 : TIMER RELAY REC–REC–OFF–PLAY
S725 : DOLBY C–OFF–B
S726 : REVERSE ⇄ – ⇄

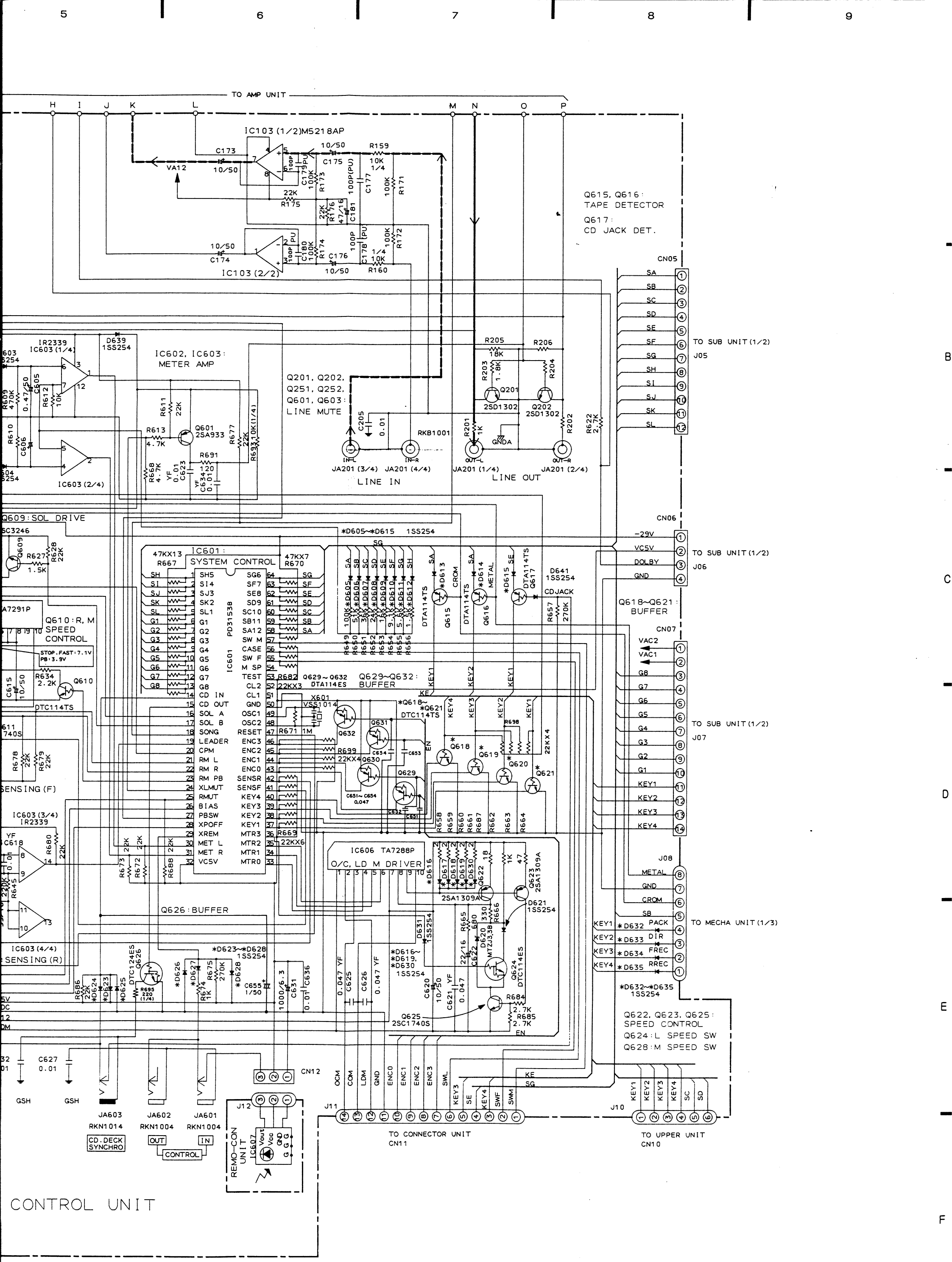
5. OTHERS

◐ : Adjusting point.

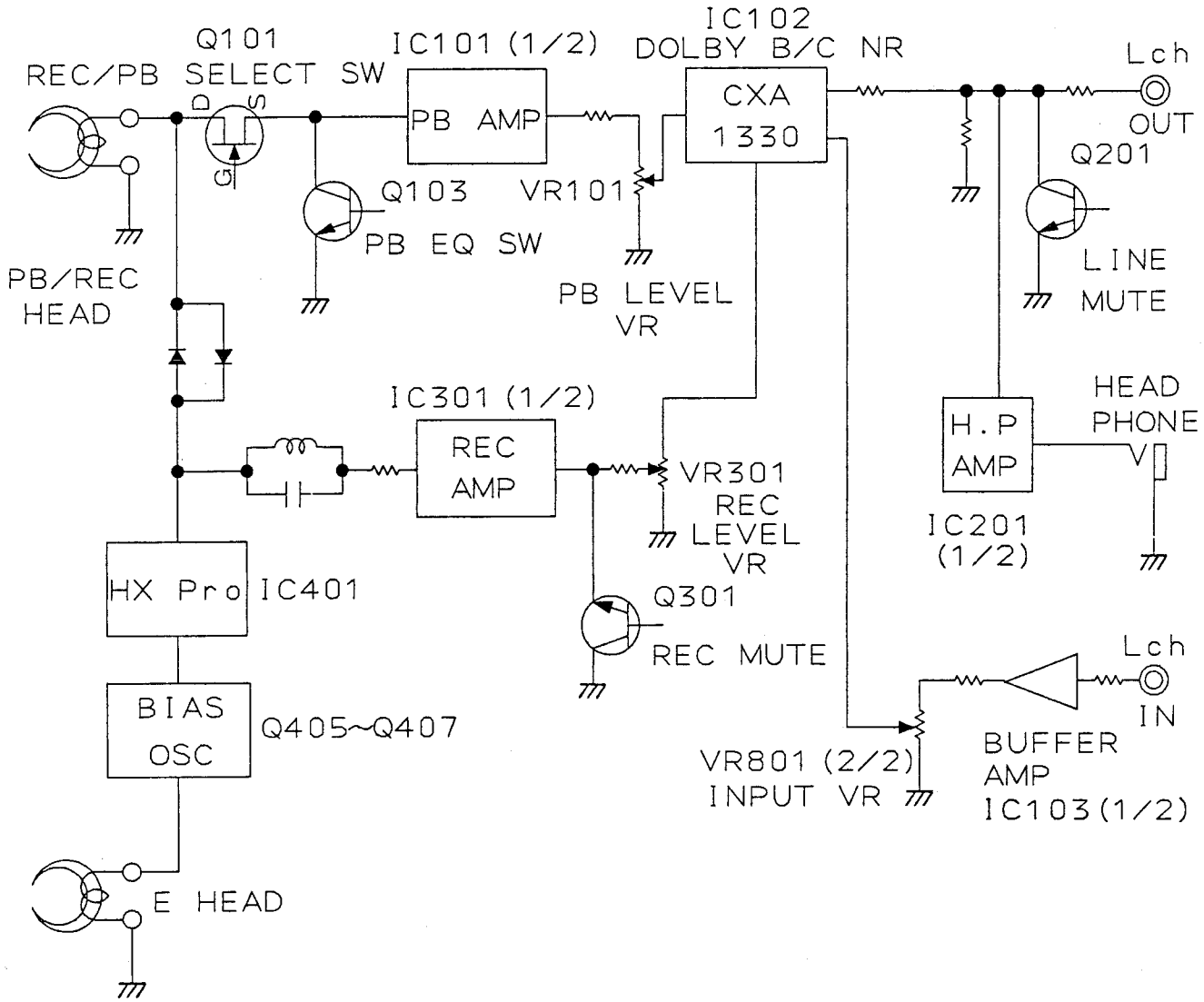
The ⚠ mark found on some component parts indicates the importace of the safty factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

PLAYBACK SIGNAL ROUTE
RECORDING SIGNAL ROUTE
▶ ADJUSTING TEST POINT


Q401, Q402 : BIAS SELECT
Q408 : REC EQ SELECT
MECHA UNIT
(2/3)
CM
RM
J09
TO AMP UNIT
Q607 : C, M DRIVE
Q608, Q609 : SOL DR
IC605 : R, M DRIVE
IC605 TA7291P
D629 1SR35-100A
PB MS : 3.9V
Q611 : SENSING (F)
IC603 (3/4), Q612, Q613 : LEADER DET
Q613 2SC1740S
Q612 2SC1740S
Q614 2SC1740S
LEADER SENS. ADJ
*VR601 VRTB6VS223
IC603 (4/4)
Q614 : SENSING (R)
RESET
RECMUT
BIAS
XPOFF
VC5V
GNDC
VC12
GNDM
IC501~IC503, Q504 : REGULATOR
TRANSISTOR B UNIT
NJM78M12FA IC502
TRANSISTOR A UNIT
NJM78M12FA IC501
IC503 MC7805CT
TO POWER TRANSFORMER
CN13
CN14
RED
BLK
GRN
BLU
WHT
VAC1
VAC2
GSH
Q501, Q502, Q503 : POWER OFF & RESET
Q503 DTC124ES
CONTR


TO AMP UNIT
H I J K L M N O P
IC103 (1/2)M5218AP
IC103 (2/2)
C173 10/50
C174 10/50
C175 10/50
C176 10/50
R159 10K 1/4
R160 10K 1/4
R171 100K
R172 100K
R173 100K
R174 100K
R175 22K
R176 22K
C177 100P(PU)
C178 100P(PU)
C179 100P PU
C180 100P PU
C181 47/16
VA12
Q615, Q616:
TAPE DETECTOR
Q617:
CD JACK DET.
CN05
SA SB SC SD SE SF SG SH SI SJ SK SL
TO SUB UNIT (1/2)
J05
IR2339
IC603 (1/4)
D639
1SS254
IC602, IC603:
METER AMP
R609 470K
R610
R612 10K
C605 0.47/50
C606
R611 22K
R613 4.7K
Q601
2SA933
R677 22K
R691
R693 10K (1/4)
R668 4.7K
C623 YF 0.01
C634 YF 0.01
IC603 (2/4)
IC603 (3/4)
IR2339
IC603 (4/4)
SENSING (R)
Q201, Q202,
Q251, Q252,
Q601, Q603:
LINE MUTE
C205 0.01
RKB1001
JA201 (3/4) JA201 (4/4)
LINE IN
R205 18K
R206
R203 1.8K
R204
Q201
2SD1302
Q202
2SD1302
R201 1K
R202
R622 2.7K
GNDA
JA201 (1/4) JA201 (2/4)
LINE OUT
Q609: SOL DRIVE
SC3246
Q609
R627 1.5K
R628 22K
A7291P
Q610: R, M
SPEED
CONTROL
STOP. FAST: 7.1V
PB: 3.9V
R634 2.2K
Q610
DTC114TS
C615 10/50
R678 22K
R679 22K
SENSING (F)
IC601:
SYSTEM CONTROL
PD31538
47KX13 R667
47KX7 R670
SH SI SJ SK SL G1 G2 G3 G4 G5 G6 G7 G8
CD IN
CD OUT
SOL A
SOL B
SONG
LEADER
CPM
RM L
RM R
RM PB
XLMUT
RMUT
BIAS
PBSW
XPOFF
XREM
MET L
MET R
VC5V
SH5 SI4 SJ3 SK2 SL1 G1 G2 G3 G4 G5 G6 G7 G8
SG6 SF7 SE8 SD9 SC10 SB11 SA12 SW M CASE SW F M SP TEST CL2 CL1 GND OSC1 OSC2 RESET ENC3 ENC2 ENC1 ENC0 SENSR SENSF KEY4 KEY3 KEY2 KEY1 MTR3 MTR2 MTR1 MTR0
R682 22KX3
R669 22KX6
X601 VSS1014
R671 1M
R699 22KX4
C653
C654
C651~C654 0.047
C651 C652
Q629~Q632:
BUFFER
Q629~Q632 DTA114ES
Q632 Q631 Q630 Q629
*D605~*D615 1SS254
SG
100K *D605 SA
51K *D606 SB
36K *D607 SC
24K *D608 SD
16K *D609 SE
9.1K *D610 SF
5.6K *D611 SG
1.5K *D612 SH
R649 R650 R651 R652 R653 R654 R655 R656
DTA114TS
*D613 CROM Q615
*D614 METAL Q616
*D615 SE DTA114TS Q617
D641 1SS254
CDJACK
R657 270K
KE
KEY1 KEY2 KEY3 KEY4
*Q618 *Q621 DTC114TS
Q618 Q619 Q620 Q621
R698 22KX4
R658 R659 R660 R661 R687 R662 R663 R664
IC606 TA7288P
O/C, LD M DRIVER
*D616 *D617 *D618 *D619 *D630
Q622 18
Q623 2SA1309A
2SA1309A
1K 47
D621 1SS254
R665 680
R666 330
D620 MTZJ3.3B
C622 22/16
Q624 DTC114ES
C620 10/50
C621 YF 0.047
R684 2.7K
R685 2.7K
Q625 2SC1740S
EN
CN06
-29V VC5V DOLBY GND
TO SUB UNIT (1/2)
J06
Q618~Q621:
BUFFER
CN07
VAC2 VAC1 G8 G7 G6 G5 G4 G3 G2 G1 KEY1 KEY2 KEY3 KEY4
TO SUB UNIT (1/2)
J07
J08
METAL GND CROM SB KEY1 KEY2 KEY3 KEY4
TO MECHA UNIT (1/3)
*D632 PACK
*D633 DIR
*D634 FREC
*D635 RREC
*D632~*D635 1SS254
Q622, Q623, Q625:
SPEED CONTROL
Q624: L SPEED SW
Q628: M SPEED SW
Q626: BUFFER
DTC124ES Q626
*D623~*D628 1SS254
*D626 *D627 *D628
R675 270K
R674 1K
C655 1/50
1000/6.3 C631
0.01 C636
0.047 YF C625 C626 0.047 YF
*D616~ *D619, *D630 1SS254
D631 1SS254
R686 22K
*D624 *D623 *D625
R695 220 (1/4)
C627 0.01
GSH GSH
JA603 RKN1014
JA602 RKN1004
JA601 RKN1004
CD. DECK SYNCHRO
OUT IN CONTROL
CN12
J12
REMO-CON UNIT IC607
Vout Vcc GND
J11
OCM COM LDM GND ENC0 ENC1 ENC2 ENC3 SWL KEY3 SE KEY4 SWF SWM
TO CONNECTOR UNIT
CN11
J10
KEY1 KEY2 KEY3 KEY4 SC SD
TO UPPER UNIT
CN10
CONTROL UNIT

6. BLOCK DIAGRAM



7. ELECTRICAL PARTS LIST

NOTES :

- Parts without part number cannot be supplied.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the impotance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560 Ω	56×10^{1}	561	RD1/4PS 5 6 1 J
47k Ω	47×10^{3}	473	RD1/4PS 4 7 3 J
0.5 Ω	0R5		RN2H 0 R 5 K
1 Ω	010		RS1P 0 1 0 K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω	562×10^{1}	5621	RN1/4SR 5 6 2 1 F

Miscellaneous Parts

P.C. BOARD ASSEMBLY

Mark	Symbol & Description	Part No.
	Amp unit	
	Control unit	
	HP. jack unit	
	Remo-con unit	
	Power switch unit	
	Transistor A unit	
	Transistor B unit	
	Sub unit	
	Bottom unit	
	Upper unit	
	Carrier unit	
	Connector unit	
	SW unit	

OTHERS

Mark	Symbol & Description	Part No.
⚠	Strain relief	CM-22C
⚠	Power cord	PDG1015
⚠	FU1, FU2 Fuse (1.5A)	REK1001
⚠	T1 Power transformer	RTT1115
	R/P, E head	RPB1030
	Motor assembly	RXM1029
	Motor assembly (Main)	RXM1032
	Solenoid	RXP1010
	Photo transistor	SPI-335-34-C

Amp Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC604	BA335
	IC102	CXA1330S
	IC201, IC301	M5218AP
	IC101	M5220P
	IC401	UPC1297CA
	Q307, Q308	DTC114ES
	Q105, Q106, Q408, Q603-Q605, Q627	DTC114TS
	Q109, Q303-Q306, Q309, Q310, Q451	DTC124ES
	Q404	2SA1283
	Q107, Q403, Q453, Q454	2SA933S
	Q103, Q104, Q301, Q302, Q401, Q402, Q606	2SC1740S
	Q405-Q407	2SC3243
	Q251, Q252	2SD1302
	Q101, Q102	2SK373
	D404	1SR35-100A
	D101-D106, D301-D304, D401-D403, D451, D452	1SS254

COILS AND FILTER

Mark	Symbol & Description	Part No.
	L401 Radial inductor	LFA121K
	L402 Oscillator coil	RTD1022
	L403, L404 Step-up coil	RTD1028
	F101, F102 MPX Filter	RTF1059
	L301, L302 Coil (6.8mH)	RTF1100
	L303, L304 Coil (10mH)	RTF1102

CAPACITORS

Mark	Symbol & Description	Part No.
	C463, C464	CCCSL101K50⊙
	C101, C102	CCPUSL100J50⊙
	C105, C106	CEANL100M16
	C111, C112	CEANL101M10
	C201, C202, C251, C252, C469, C610, C613	CEASR10M50

Mark	Symbol & Description	Part No.
	C169, C170	CEASR22M50
	C157–C160, C309, C310	CEASR33M50
	C612	CEASR47M50
	C145, C146, C151, C152, C307, C308, C639	CEAS010M50
	C115, C116, C147–C150, C161, C162, C165–C167, C321, C322, C451, C453	CEAS100M50
	C253–C255	CEAS101M25
	C614, C633, C640	CEAS330M16
	C331, C332, C452	CEAS4R7M50
	C107, C121, C164, C305, C323, C401–C403	CEAS470M16
	C301, C302	CFTXA182J50
	C153–C156	CFTXA222J50
	C113, C114, C117, C118, C459, C460	CFTXA223J50
	C327–C330, C404, C405	CFTXA332J50
	C335, C336	CFTXA392J50
	C406	CFTXA682J50
	C407	CFTXA273J50
	C325, C326	CFTXA822J50
	C119, C303, C457, C458	CKCYF103Z50
	C461, C462, C611	CKCYF473Z50
	C109, C110, C467	CKPUYB101K50
	C333, C334	CKPUYB221K50
	C103, C104, C455, C456	CKPUYB821K50
	C408	CQPA682J100
	C465, C466 (430p)	RCG1005

RESISTORS

Mark	Symbol & Description	Part No.
	VR403 Semi-fixed (100 Ω)	RCP1013
	VR101, VR102, VR301, VR302, VR451, VR452 Semi-fixed (22k)	VRTB6HS223
	R407, R408	RD½PMF□□□J
	R127, R169, R255, R256, R259, R261, R329, R330, R410, R416	RD¼PM□□□J
	Other resistors	RD⅙PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	CN3 Jumper connector 5P	KPC5

Control Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC603	IR2339
⚠	IC503	MC7805CT
	IC103, IC602	M5218AP
	IC601	PD3153B
	IC606	TA7288P
	IC605	TA7291P
	Q629–Q632	DTA114ES
	Q615–Q617	DTA114TS
	Q624	DTC114ES
	Q610, Q618–Q621	DTC114TS
	Q503, Q626	DTC124ES
⚠	Q504	2SA1283
	Q622, Q623	2SA1309A
	Q501, Q601	2SA933S
	Q502, Q611–Q614, Q625	2SC1740S
	Q607–Q609	2SC3246
	Q201, Q202	2SD1302
	D620	MTZJ3.3B
⚠	D507	MTZJ33B
	D513	MTZ3.6B
	D601	MTZ5.1B
⚠	D508	MTZ6.2B
⚠	D502	1B2C1–LC2
⚠	D501	1B2Z1–LC2
⚠	D503, D509, D514	1SR35–100A
	D629	1SR35–100A
	D504–D506, D511, D512, D602–D619, D621, D623–D628, D630–D635, D638, D639, D641	1SS254

CAPACITORS

Mark	Symbol & Description	Part No.
	C605, C606	CEASR47M50
	C516, C655	CEAS010M50
	C173–C176, C508, C603, C604, C615, C620	CEAS100M50
	C505	CEAS101M25
	C512	CEAS101M50
	C631	CEAS102M6R3
	C622	CEAS220M16
	C513	CEAS221M35
	C624	CEAS330M16
	C507	CEAS331M6R3
	C506	CEAS332M16
	C503	CEAS332M35
	C510	CEAS4R7M50
	C181, C504, C607–C609	CEAS470M16
	C514	CEAS470M50
	C518	CEAS471M35
	C205, C509, C511, C617, C618, C623, C627, C632, C634–C636	CKCYF103Z50
	C501, C502, C601, C602, C621, C625, C626, C519, C638, C651–C654	CKCYF473Z50
	C177–C180	CKPUYB101K50
	C616, C619	CKPUYB681K50

RESISTORS

Mark	Symbol & Description	Part No.
	R667	RA13T473J
	R682	RA3T223J
	R698, R699	RA4T223J
	R669	RA6T223J
	R670	RA7T473J

Mark	Symbol & Description	Part No.
	R643	RD½LF473J
⚠	R629	RS2LMF390J
	VR601 Semi-fixed (22k)	VRTB6VS223
	R159, R160, R512, R630, R631, R693, R695	RD¼PM□□□J
⚠	R510, R511	RD¼PM□□□J
	Other resistors	RD⅙PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	JA201 Pin jack 4P	RKB1001
	JA601, JA602 Remote control jack	RKN1004
	JA603 Mini jack	RKN1014
	X601 Ceramic oscillator	VSS1014

HP. jack Unit

CAPACITOR

Mark	Symbol & Description	Part No.
	C257	CKCYF473Z50

RESISTORS

Mark	Symbol & Description	Part No.
	R263, R264	RD¼PM681J

OTHERS

Mark	Symbol & Description	Part No.
	JA202 Headphone jack	RKN1002

Remo-con Unit

OTHERS

Mark	Symbol & Description	Part No.
	Remote sensor unit	GP1U52X

Power Switch Unit

SWITCH

Mark	Symbol & Description	Part No.
⚠	S1001 Power switch (POWER)	RSA-063

CAPACITOR

Mark	Symbol & Description	Part No.
⚠	C1001 (0.01 μF/AC400V)	RCG-009

Transistor A Unit

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠	IC501	NJM78M12FA

Transistor B Unit

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠	IC502	NJM78M12FA

Sub Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	Q701-Q708	2SC1740S
	D701-D712	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
	S701-S723 Tact switch (1, 2, 3, 4, 5, 6, OPEN/CLOSE, REW, REV, STOP, FWD, FF, RETURN, REC, PAUSE, REC.MUTE, CD SYNC, C.MODE, C.RESET, RELAY, RANDOM, C.SCAN, ALL REW)	RSG1034
	S725 Slide switch (DOLBY NR)	RSH1007
	S724 Slide switch (TIMER)	RSH1008
	S726 Slide switch (REVERSE MODE)	RSH1012

RESISTORS

Mark	Symbol & Description	Part No.
	VR802 Variable resistor (5kB)	RCS1016
	VR801 Variable resistor (5k-A)	RCV1050
	Other resistors	RD⅙PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	Fluorescent indicator	RAW1037

Bottom Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	D11, D12	1SS254

Upper Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	D1-D6	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
	S1-S6 Push switch (1, 2, 3, 4, 5, 6)	PSH1008

Carrier Unit

Mark	Symbol & Description	Part No.
	S21 Micro switch	RSF1007

OTHERS

Mark	Symbol & Description	Part No.
	CN202 Connector	5597−10APB

Connector Unit

There is no supply part in this unit.

SW unit

SWITCH

Mark	Symbol & Description	Part No.
	S31 Lever switch	RSK1003

8. ADJUSTMENTS

8.1 MECHANICAL ADJUSTMENT

1. Tape Speed Adjustment

Mode	Test tape	Adjustment position	Specification rating (playback frequency)
PLAY	Play the STD-301 tape (3 kHz)	Capstan motor adjustment VR	3000 Hz±5 Hz

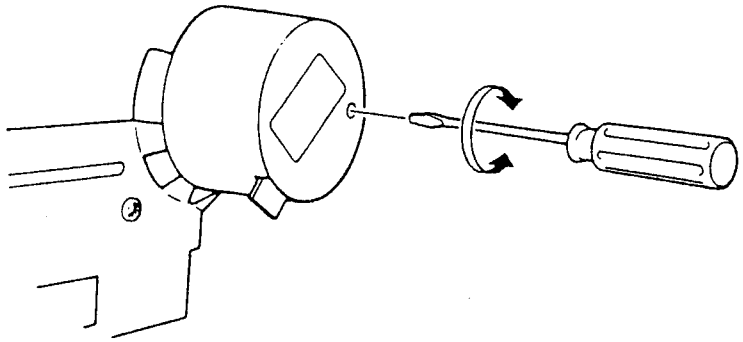


Fig. 8-1

8.2 ELECTRICAL ADJUSTMENTS

Adjustment Conditions

1. The mechanical adjustments must be completed first.
2. The head must be cleaned and demagnetized.
3. Turn power on allow the deck to warm up for at least a few minutes before commencing any electrical adjustments.
4. The reference signal is 0dBv=1Vrms.
5. Connect a 50 kΩ (or between 47k to 52 kΩ) load resistance to the OUTPUT terminals.
6. Unless otherwise specified, the switches listed below are left in the positions indicated.
   DOLBY NR : OFF
   TAPE SELECTOR : NORM

Test Tapes

STD-331B : Playback adjustments (See Fig. 8-2)
STD-630 : NORMAL blank tape
STD-620 : CrO_2 blank tape
STD-610 : METAL blank tape

List of Adjustments

Playback sections

1. Head azimuth adjustment.
2. Playback level adjustment.

Recording sections

1. Bias oscillator adjustment.
2. Erase current adjustment.
3. Recording bias adjustment.
4. Recording level adjustment.
5. Level meter check.
6. Leader tape detection operation adjustment.

NOTE: This unit has an automatic tape selection feature.

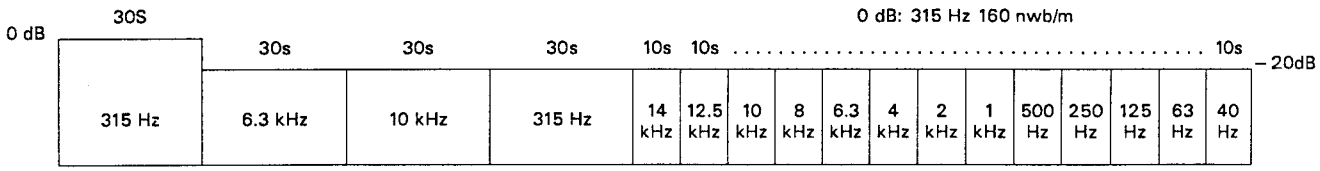


Fig. 8-2. Constants of the test tape STD-331B

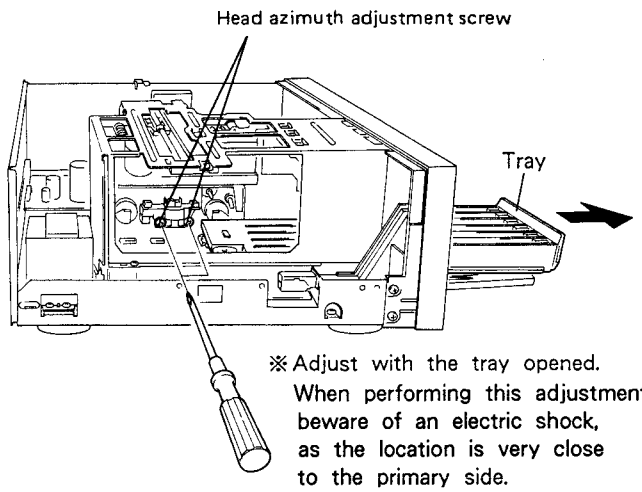

Head azimuth adjustment screw
Tray
※Adjust with the tray opened.
When performing this adjustment,
beware of an electric shock,
as the location is very close
to the primary side.

Fig. 8-3. Head azimuth adjustment

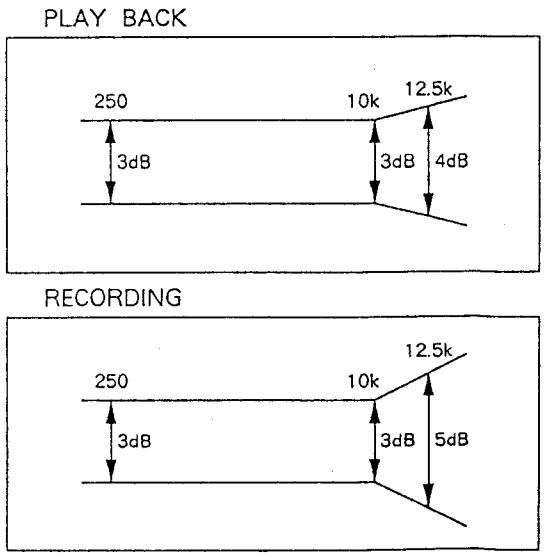


Fig. 8-4. Allowable playback frequency response zone

PLAYBACK SECTION

1. Head Azimuth Adjustment

• Turn VR101 and VR102 to mechanical center positions.

No.	Mode	Input signal & test tape	Adjustment location	Measuring location	Adjustment value	Remarks
1.	PLAY	Play the 10 kHz/−20 dB section of STD-331B test tape.	Head azimuth adjustment screw. (See Fig. 8-3)	LINE OUT	Maximum playback signal level.	
2.	STOP	Lock the screw with screw lock after completing adjustment.				

2. Playback level Adjustment

• This adjustment determines the DOLBY NR level, and must be performed with great care.

No.	Mode	Input signal & test tape	Adjustment location		Measuring location	Adjustment value	Remarks
1.	PLAY	Play the 315 Hz/0 dB section of the STD-331B test tape.	Deck I	VR101 (Lch) VR102 (Rch)	TP. 1 (Lch) TP. 2 (Rch)	−10.7 dBv	

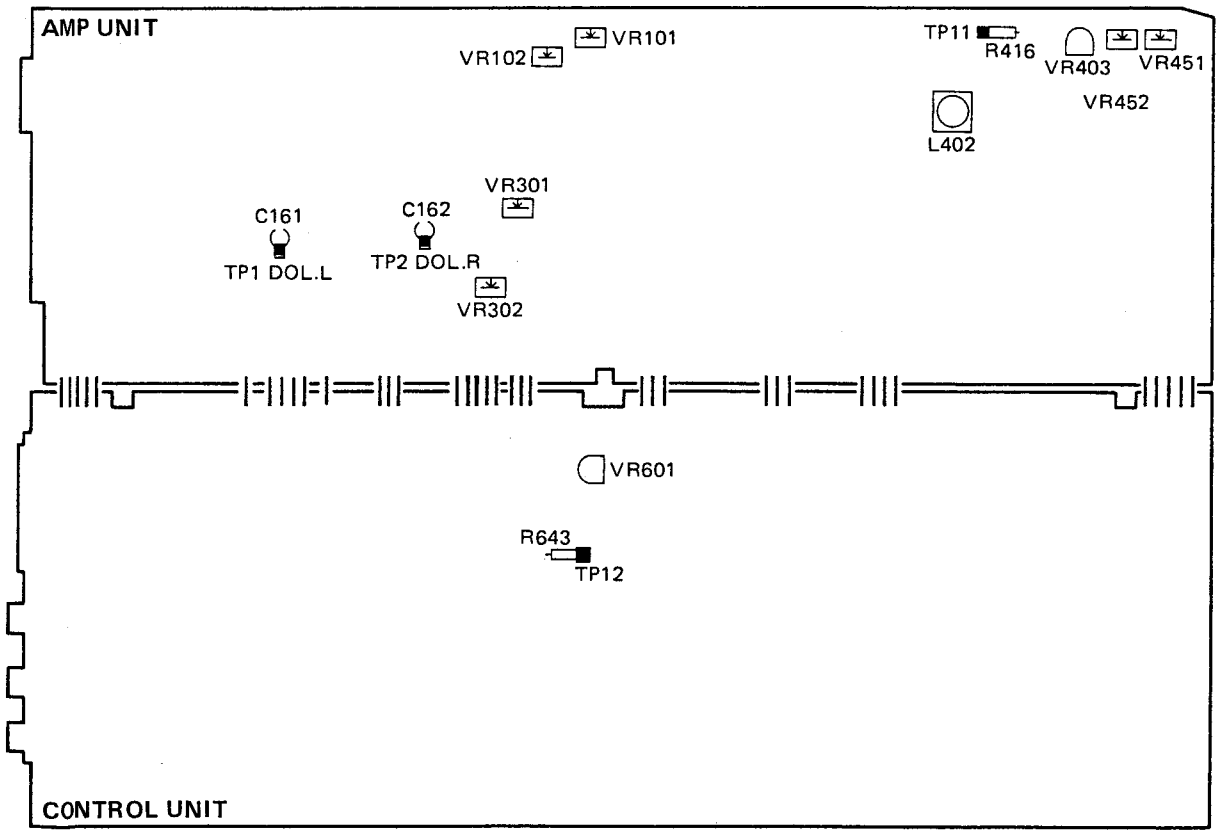


Fig. 8-5. Adjusting Points

RECORDING SECTION

1. Bias Oscillator Adjustment

No.	Mode	Input signal & test tape	Adjustment location		Measuring location	Adjustment value	Remarks
1.	REC	Load the STD-610 test tape with no input signal.	Deck I	L 402	TP. 11	105 kHz ±300 Hz	

2. Erase Current Adjustment

No.	Mode	Input signal & test tape	Adjustment location		Measuring location	Adjustment value	Remarks
1.	REC	Load the STD-610 test tape with no input signal.	Deck I	VR403	TP. 11	165 mV AC	

3. Recording Bias Adjustment

• After the adjustment, caution should be exercised so as not to become under bias by checking the distortion rate.

No.	Mode	Input signal & test tape	Adjustment location		Measuring location	Adjustment value	Remarks
1.	STOP	Set the TAPE SELECTOR switch to the NORM position.					
2.	REC	Record the 315 Hz and 6.3 kHz signals at −20 dBv input level and playback.	Deck I	VR451 (Lch) VR452 (Rch)	LINE OUT	Repeatedly record, playback and adjust so that the playback level of 6.3 kHz signal becomes +1.0 dB±0.5 dB when compared with the 315 Hz signal.	

4. Recording Level Adjustment

No.	Mode	Input signal & test tape	Adjustment location		Measuring location	Adjustment value	Remarks
1.	STOP	Set the TAPE SELECTOR switch to the NORM position.					
2.	REC PAUSE	Apply a 315 Hz/0 dBv signal to the line Input terminals, load the STD-630 test tape.	Rec Level control volume		TP. 1 (Lch) TP. 2 (Rch)	−11.2 dBv	
3.	STOP	Set the DOLBY NR switch to the ON position. (DOLBY B)					
4.	REC/ PLAY	Record the above signal onto the STD-630 test tape, and playback.	Deck I	VR301 (Lch) VR302 (Rch)	TP. 1 (Lch) TP. 2 (Rch)	Repeatedly record, playback and adjust so that the playback signal level becomes −11.2 dB.	
5.	STOP	Set the TAPE SELECTOR switch to the CrO_2 position.					
6.	REC/ PLAY	Record the above signal onto the STD-620 test tape, and playback.	Check		TP. 1 (Lch) TP. 2 (Rch)	−11.2 dBv ±1.5 dB	
7.	STOP	Set the TAPE SELECTOR switch to the METAL position.					
8.	REC/ PLAY	Record the above signal onto the STD-610 test tape, and playback.	Check		TP. 1 (Lch) TP. 2 (Rch)	−11.2 dBv ±1.5 dB	

5. Level Meter Check

No.	Mode	Input signal & test tape	Adjustment location	Measuring location	Adjustment value	Remarks
1.	REC PAUSE	Apply a 315 Hz/−10 dBv (316 mV) signal to the Line Input terminals.	Rec Level control volume	TP. 1 (Lch) TP. 2 (Rch)	Check that the level meters "0 dB" light up within −11.2 dBv ±2 dB of the signal output level.	

6. Leader Tape Detection Operation Adjustment

No.	Mode	Input signal & test tape	Adjustment location		Measuring location		Adjustment value	Remarks
1.	PLAY	No input-load an empty cassette half.	Deck I	VR601	Deck I	TP. 12	1.0V ± $^{0.2}_{0}$V (DC)	
2.	Check that the leader tape is correctly detected (inboth FWD and REV directions when in endless reverse mode).							

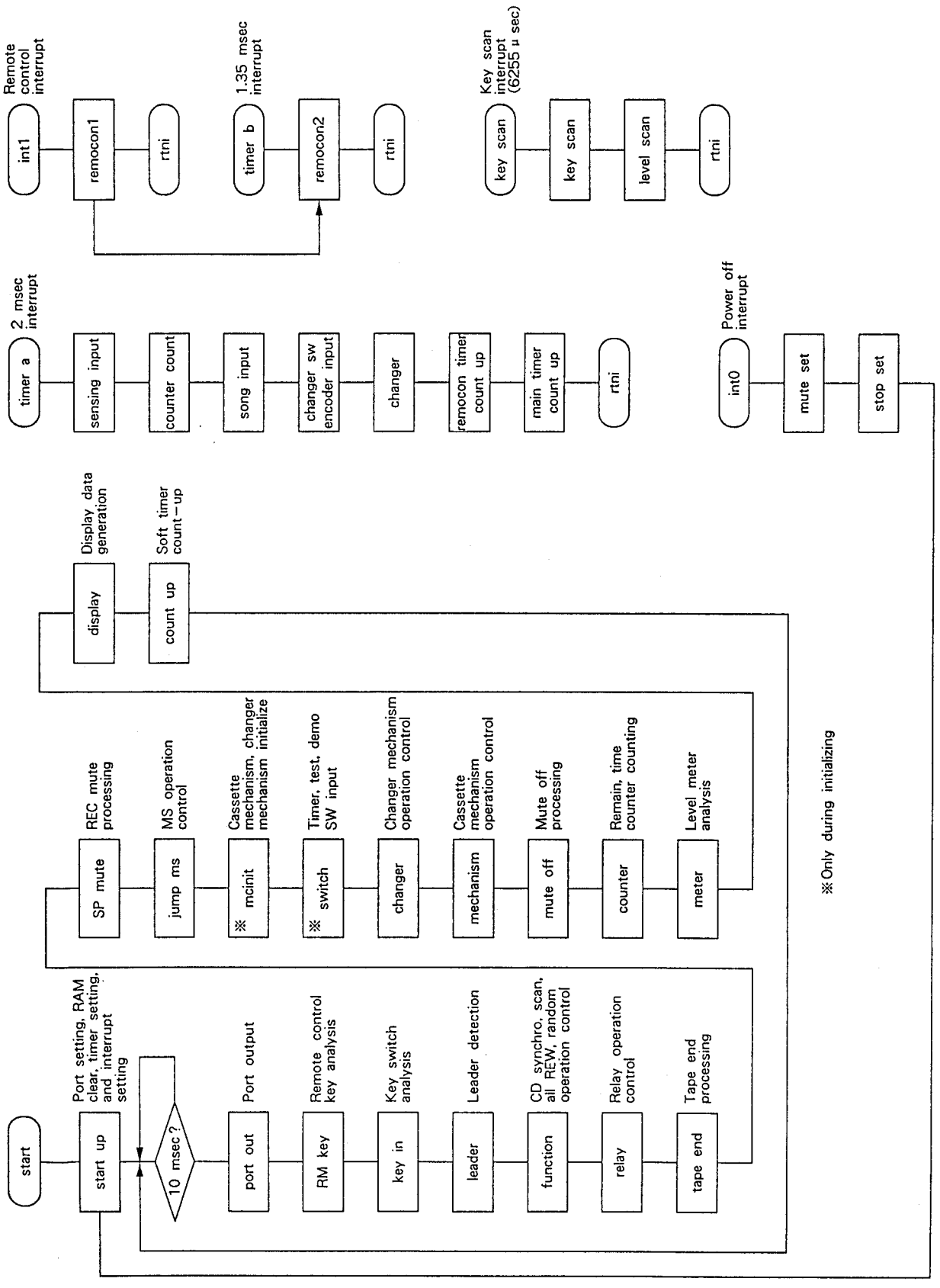
9. IC AND CIRCUIT DESCRIPTIONS

9.1 PD3153B PIN DESCRIPTION

Pin No.	I/O	Pin Name	Pin Description	Pin Processing
1	O	Sh	Segment output, key scan output, and level scan output	Pull-down
2	O	Si	Segment output, key scan output, and level scan output	Pull-down
3	O	Sj	Segment output, key scan output, and level scan output	Pull-down
4	O	Sk	Segment output, key scan output, and level scan output	Pull-down
5	O	Sl	Segment output, key scan output, and level scan output	Pull-down
6	O	G1	Grid output	Pull-down
7	O	G2	Grid output	Pull-down
8	O	G3	Grid output	Pull-down
9	O	G4	Grid output	Pull-down
10	O	G5	Grid output	Pull-down
11	O	G6	Grid output	Pull-down
12	O	G7	Grid output	Pull-down
13	O	G8	Grid output	Pull-down
14	I	CDIN	Synchro control input	Pull-up
15	O	CDOUT	Synchro control output	
16	O	SOLA	Solenoid control, solenoid ON when "H"	
17	O	SOLB	Power drop control with solenoid ON, power dropped when "H"	
18	I	SONG	Program interrupt detection, program interruption when "L"	Pull-up
19	I	LEADER	Leader detection pulse input, leader section ON when "H"	Pull-up
20	O	CPM	Capstan motor control, capstan motor ON when "H"	
21	O	RML	Reel motor rotating direction control, REV direction ON when "H"	Pull-down
22	O	RMR	Reel motor rotation direction control, FWD direction ON when "H"	Pull-down
23	O	RMPB	Reel motor torque control, play torque ON when "H"	
24	O	XLMUT	Line mute control, mute ON when "L"	
25	O	RMUT	Record mute control, mute ON when "H"	
26	O	BIAS	Bias OSC control, ON when "H"	
27	O	PBSW	REC PB head switching, PB ON (during PLAY and MS) when "H"	
28	I	XPOFF	Power OFF pulse input, normally "H" ; interrupt when "L"	
29	I	XREM	REMOCON pulse input	
30	I	METL	Lch meter input	Pull-up
31	I	METR	Rch meter input	Pull-up
32		VC5V	Power supply (+5V)	

Pin No.	I/O	Pin Name	Pin Description	Pin Processing
33	O	MTR0	LD motor, O/C motor selecting control, LD motor is selected when "H"	
34	O	MTR1	LD motor, O/C motor rotating direction control	
35	O	MTR2	LD motor, O/C motor rotating direction control	
36	O	MTR3	LD motor, O/C motor speed control, low speed when "H"	
37	I	KEY1	Key scan data input	Pull-up
38	I	KEY2	Key scan data input	Pull-up
39	I	KEY3	Key scan data input	Pull-up
40	I	KEY4	Key scan data input	Pull-up
41	I	SENSF	FWD side sensing pulse input	Pull-up
42	I	SENSR	REV side sensing pulse input	Pull-up
43	I	ENC0	Encoder input	Pull-up
44	I	ENC1	Encoder input	Pull-up
45	I	ENC2	Encoder input	Pull-up
46	I	ENC3	Encoder input	Pull-up
47	I	RESET	Reset pulse input, reset when "H"	
48	O	OSC2	Clock output	
49	I	OSC1	Clock input (4.19 MHz)	
50		GND	GND (0V)	
51	I	CL1		
52	O	CL2		
53	I	TEST		
54	O	MSP	O/C motor, middle speed control, middle speed when "H"	Pull-down
55	I	SW_F	SW_F input, ON when "L".	Pull-up
56	I	SW_L	SW_L input, ON when "L"	Pull-up
57	I	SW_M	SW_M input, ON when "L"	Pull-up
58	O	Sa (12)	Segment output, key scan output, and level scan output	Pull-down
59	O	Sb (11)	Segment output, key scan output, and level scan output	Pull-down
60	O	Sc (10)	Segment output, key scan output, and level scan output	Pull-down
61	O	Sd (9)	Segment output, key scan output, and level scan output	Pull-down
62	O	Se (8)	Segment output, key scan output, and level scan output	Pull-down
63	O	Sf (7)	Segment output, key scan output, and level scan output	Pull-down
64	O	Sg (6)	Segment output, key scan output, and level scan output	Pull-down

9.2 PD3153B OPERATION FLOW



POWER ON INITIALIZE

1. CPU Reset

The CPU is placed into the reset state by making the RESET terminal of the CPU "H" in level.
When the power is ON, the resetting is made together with the Vcc of the CPU, and the level is brought "L" after Vcc has stabilized. As a result, the reset is released after that and the program starts.
In the reset state, all ports of the CPU become high impedance, and "L" and "H" of the ports are determined by the external circuit of the CPU.

2. Power ON Port Initialize

After the reset state has been released, all ports of the CPU are placed into the same mode as the mechanism is in the stopped state.

3. Power ON Mechanism Initialize

The CPU initializes the mechanism when turning the power on. This is done for stopping the mechanism. For this purpose, turn on the capstan motor for 1260 msec.
As the mechanism keeps the solenoid on during play. So, the mechanism can be put into the stopped state by initializing as explained above. After that, proceed with the initialization of the changer mechanism. (Refer to the appropriate section of "Changer Mechanism Control".)

4. Power ON Mask Time

The CPU does not accept any key-in operations, including remote control operation for a period of 4 to 10 seconds after power on (reset release) as there is a need to wait for the amplifier circuit of the deck to stabilize. During this time, the FL display alternately shows ▷▷▷▷ and ◁◁◁◁.

Note : The time till the end of initialization varies depending upon the changer mechanism condition.

POWER OFF PROCESSING

1. Power OFF Interrupt

When the power OFF terminal of the CPU is made "L" level, all operations are discontinued, and the power off processing is made. This is referred to as the "Power OFF Interrupt". This process has priority over any operations.
The power off pulse given to the CPU terminals detects that the power is turned off and it must be generated before Vcc of the CPU has fallen.

2. Power OFF Processing

In the above power off interrupt, the process is carried out as follows : First, the AMP system (line mute and REC mute) are closed (into the mute state), and the bias is turned off to cause PB SW to switch off. Protection such as noise prevention is made by holding noise when the power is off, or noise prevention on the tape. The mechanism is then placed into the stop state.

3. Power OFF Reset

The CPU is reset by the reset pulse after making the process above. Also, if the CPU is not reset or Vcc is in the steady state after power off processing, the CPU starts to make normal operation.

9.3 CHANGER MECHANISM CONTROL

1. Outline

The changer mechanism control consists of open/close job for controlling the tray open/close operation and the loading job for controlling the loading/unloading operation.
These jobs make control of each motor with the below-mentioned switch and encoder and performs subsequent operation.

2. SW and Encoder Input

(a) **SW_F**
This switch detects that the tray has been opened.

(b) **SW_M**
This is a switch for detecting the closing position. It has two protrusions which serve as the speed reducing points at the time of closing and unloading.

(c) **SW_R**
This switch detects that the drive plate has reached the last portion.

(d) **SW_L**
This switch detects that the carrier has reached the cassette mechanism position.

(e) **CASE**
This detects that the carrier has come into contact with the cassette holder when initializing.

(f) **ENCORDER**
This encoder is a 4 bit type for lateral control (LD motor).

(g) **HALF SW**
This makes detection of a cassette "half state" on the tray. It judges whether or not the loading operation can be made.

3. Motor Control

The loading motor and the open/close motor are controlled with four ports MTR 0 to 3. Both motors are driven by one driver, and the operations of these will never be made at the same time under any circumstances.

4. Loading Job

Cassette half loading on to the cassette mechanism is made from the tray, and its returning operation to the tray from the cassette mechanism are performed.

(a) **Lateral Direction (LD Motor Control)**
The carrier is operated by the loading motor. The carrier location is judged by the encoder.
Since the zone detection system is in use, when carrier has past the target position, the control is so made that the motor is reversed and that the carrier returns to its home position as a result. Also, the carrier is slowed down at a position just one before the target position so that it detects the zone and stops reliably. But no speed deceleration is made at the time of mechanism loading. Judgment of the mechanism position is based on the
fact that the encoder is in the mechanism position and that SW_L is turned ON.

(b) **Longitudinal Direction (O/C Motor Control)**
The drive plate is operated by the open/close motor. Its locations are judged by SW_M and SW_R.
SW_M has two protrusions. Normally (in an unloading state), the drive plate stops at the rear protrusion position. The front protrusion serves as a speed decelerating point at the time of unloading. This front protrusion makes control such that the drive plate stops when the speed is slowed down at the ON → OFF edge of the front protrusion, and the drive plate stops when the rear protrusion has been turned on. At the time of loading, pull the drive plate backward until SW_R turns on.

5. Open/Close Job

Tray open/close operation is made.

(a) **Open**
Turn the open/close motor forward and the tray stops after SW_F has been turned on.

(b) **Close**
This operation varies depending upon whether or not the cassette half is in the cassette mechanism. When the cassette half is in it, pull the drive plate until SW_R can be turned ON. But when the cassette half is not in it, the control is by SW_M, and slow reversal is made at the ON → OFF edge of the rear protrusion. The motor stops when SW_M has been turned on once again.

6. Protection Function

The following protection functions are available for the motors and mechanical lock prevention :

(a) **Emergency**
In the loading job, if the operation is not completed even after an elapse of twenty seconds or more from motor rotation, this abnormality is judged an emergency, thereby causing the motor to stop. As a result, the loading operation is stopped, making no key-in to accept in any cases.
In the open/close job, the direction of motor rotation is reversed if the operation is not completed even after an elapse of 6 seconds from motor rotation. Further, if the operation is still not completed after another 6 seconds, this is judged an emergency. As a result, the motor is brought to a stop. In this case, however, key-in is accepted.

(b) **Erroneous Insertion Prevention**
To prevent erratic operation from occurring when the cassette half is inserted into the position of that cassette half on the tray, notwithstanding that the cassette half has already been loaded, the tray is opened and the loading/unloading operations are prevented from being made upon sensing that the same cassette half has been inserted in there.

7. Initialize

Initialize is made at the end of the cassette mechanism initialization with the power turned on. The status is judged by each changer mechanism SW, encoder, and pack sensing SW, either the loading, unloading, or tray open state is established. (Refer to Fig. 9-1 "Matrix") But initialize different from normal one must be done in the TIMER mode.
If the encoder is in the blank position during the TIMER mode of operation, it is judged the power OFF condition in the middle of the position toward the next cassette half after unloading. So, the loading of the cassette half next to that blank is made. Also, if it is not the blank position, that cassette half is loaded.
With the foregoing operation, data of the encoder at that time is kept in memory following the cassette mechanism initialization.

ENC	SW_L	PACK	SW_R	SW_M	SW_F	Process-ing
0	○	○	○			①
↓	○	○		○		②
↓	○	○			○	②
↓	○	○	–	–	–	②
↓	○	×	○			③
↓	○	×		○		③
↓	○	×			○	⑤
↓	○	×	–	–	–	②
≠BLANK			○			⑥
↓				○		④
↓					○	②
↓			–	–	–	②
BLANK			○			⑥
↓			–	–	–	⑦

Fig. 9-1. Changer Mechanism Initialize Matrix

(a) Initialize Process Contents

①Case check

When a cassette half has already been loaded at the time of power on, check that how many halves there are before here.

[Operation]
When the pack presence is sensed, the LD motor should be turned to move the carrier leftward. There is a case switch on the carrier. The design is therefore made so that the case switch is turned on when it has come into contact with the cassette holder. Now, judgment is made just which cassette half it is based on the encoder data when the case switch has been turned on.

②Judgment is made once again after turning on SW__R.

If no switch is turned on, the pack is present, but if the SW__R is not on, pull the drive plate backward until SW__R is turned on. And then perform judgment according to the matrix once again.

[Operation]
Stop when SW__R turns on after rotating O/C motor backward.

③SW__M initialize

When SW__M is turned on, it is not possible to determine whether the protrusion is the front one or the rear one. So, initialize SW__M once again to select the normal position (the rear protrusion). Also, when there is no pack and SW__R is on, initialize SW__M to turn on it.

[Operation]
Turn the O/C motor backward. When SW__R is turned on, reverse the motor rotation and then slow it down at the ON → OFF edge of the front protrusion. Stop the motor when the rear protrusion has been turned on.
If SW__R is on, rotate the O/C motor forward and then slow it down at the ON → OFF edge of the front protrusion. Stop the motor when the rear protrusion has been turned on.

④Move the carrier to the mechanism position after initializing SW__M.

When the carrier is not in the cassette mechanism position, it is necessary to move it back to the cassette mechanism position. But when SW__M is not in the normal position (the rear protrusion), the carrier cannot be moved. So, move the carrier back to the cassette mechanism position after setting SW__M to the normal position by initializing SW__M.

[Operation]
Turn the LD motor to move the carrier rightward after operation of ③. Then stop when SW__L turns on.

⑤Open state setting

Now, the open completed state is established. So, hold this condition as it is.

⑥Move the carrier to the cassette mechanism position and check the case.

When the carrier is in the blank position, it is necessary to move the carrier back to the cassette mechanism position. The state in which the carrier is in the blank position, and in which SW__R is on indicates that the carrier is being moved by loading and unloading. After moving it back to the cassette mechanism position, the case check should be made.

[Operation]
When SW__L is turned on after rotating the LD motor and moving the carrier rightward, the operation of ① is made.

⑦Move the carrier to the cassette mechanism position and initialize SW__M.

When the carrier is in the blank position, it is necessary to move it back to the cassette mechanism position. The state in which the carrier is in the blank position and in which SW__R is off indicates that the carrier is being moved by loading. After moving it back to the cassette mechanism position, and initialize SW__M to move SW__M to the normal position (the rear protrusion).

[Operation]
When the SW__L is turned on after rotating the LD motor and moving the carrier rightward, the operation of ③ is mode.

8. Encoder Input

Carrier position control is made by the encoder. Using a 4 bit rotary encoder, input is made on ports ENC 0 to 3 at very 2 msec, and the data coincided two times is converted into HEX code. The encode patterns are gray code, and it represent the absolute positions when converted into HEX code. So, when the current position is known, the direction of rotation is automatically determined.

POSITION	ENCODE PATTERN				HEX		
	ENC3	ENC2	ENC1	ENC0	INPUT	XINPUT	DECODE
BLANK	1	1	1	0	E	1	D
MECHA	1	1	1	1	F	0	0
BLANK	1	1	0	1	D	2	1
HALF6	1	0	0	1	9	6	2
BLANK	1	0	0	0	8	7	3
HALF5	1	0	1	0	A	5	4
BLANK	1	0	1	1	B	4	5
HALF4	0	0	1	1	3	C	6
BLANK	0	0	0	1	1	E	7
HALF3	0	1	0	1	5	A	8
BLANK	0	1	1	1	7	8	9
HALF2	0	1	1	0	6	9	A
BLANK	0	1	0	0	4	B	B
HALF1	1	1	0	0	C	3	C
BLANK	1	1	1	0	E	1	D

Fig. 9-2. Encoder Pattern

9.4 ALL REW

Perform REW operation starting with the cassette half with the smallest number and rewind all halves.

[Acceptance Conditions]
①The mode is neither the REC mode nor the function mode.
②One or more cassette halves should be available. (When the tray is open, judgment should be made after closing the tray).

[Operation]
When no cassette half is loaded, perform REW operation after loading the one with the smallest number. If a cassette half is already loaded, unload the half and then load the cassette half with the smallest number to perform REW operation.
During operation the unit enters the RELAY mode. The RELAY mode is released at the end of operation.

[Display]
The RELAY indicator lights, and the "ALL" indicator appears in the 4-digit counter.

[Release]
①If effective key-in is performed during operation, operation stops, the RELAY mode is released, and the keyed-in operation should be performed.

Note :If key-in is performed during unloading operation, the keyed-in operation should be made after loading the next cassette half since it is already in loading assist operation.

②If the RELAY mode is released during operation by RELAY key input, the ALL REW mode is released as well.

Note1 : If RELAY key-in is performed during REW operation, the ALL REW mode is released, and the REW operation continues.
Note2 : If RELAY key-in is performed during unloading operation, the REW operation is performed after loading the next cassette half since it is already in loading assist operation.

9.5 CASSETTE SCAN

The forward play of Cassette halves are done sequentially 10 sec each as from the youngest numbered one.

[Acceptance Conditions]
①The operating mode is neither the REC mode nor function mode.
②One or more cassette half is in existence. (When the tray is open, judgment must be made after closing the tray.)

[Operation]
If no cassette half is loaded on, the youngest numbered one should be loaded to start the FWD PLAY. If a cassette half is already loaded, such a half should be unloaded, and the youngest numbered half should be loaded to start the FWD PLAY. During operation, the mode becomes the RELAY mode. The RELAY mode is released at the end. The equipment goes into the MS operation if there is a blank period of 15 seconds before starting the playback.

[Display]
The RELAY IND lights, and the "SCAN" IND then lights at the 4-digit counter section.

[Release]
①If effective key-in is made during operation, the operation is stopped, and the RELAY mode is released, and the key-in operation entered is performed.

Note : When there is key-in during unloading, key-in operation of the one input after loading the cassette half should be made because the loading assist operation for the next cassette half is already in progress.

②Make relay key-in during operation to clear the RELAY mode. When this is done, the CASSETTE SCAN mode can be released.

Note1 : When the relay key-in is made during the FWD PLAY, the CASSETTE SCAN mode is cleaned, but the FWD PLAY operation continues.

Note2 : If there is the relay key-in during the unloading operation, it indicates that the next cassette half is already in loading assist operation. So, the FWD PLAY operation is made after loading the cassette half.

9.6 CASSETTE RANDOM PLAY

Select the cassette half at random and make playback. To do playback, select the next cassette half after playback of one program and perform the playback of another program. Repeat this procedure afterwards.

[Acceptance Conditions]
①The mode is neither the REC mode nor the FUNCTION mode.
②Two or more cassette halves must be available. (When the tray is open, judgment should be made after closing the tray.)

[Operation]
Each cassette half first starts the playback from the FWD direction. After that, as the direction of each cassette half is kept in memory, playback is made accordingly.
If there is a blank period of 15 seconds after starting the playback, the equipment goes into the MS operation. Also, if there is a blank period of 3 seconds during playback, it should be judged as being between programs and the next cassette half should then be selected. When all the cassette halves come to the tape end, the operation is terminated. The last cassette half makes normal playback.
Note : The RELAY mode is released during operation.

[Display]
The RANDOM IND lights, [1] to [6] indicators sequentially light during the cassette half selection, and the cassette half number only lights after cassette half decision.

[Release]
①When there is effective key-in during the operation, stop the operation and the keyed-in operation should be made.

Note : If there is key-in during the unloading operation, it indicates that the next cassette half is already in loading assist operation. So, the keyed-in operation is made after loading the cassette half.

9.7 ADDITIONAL FUNCTIONS

1. TEST1 Mode (Sc. KEY3 Short)

A cassette mechanism check and changer mechanism status monitor are performed. When the power is on, the initialization of the cassette mechanism only is made, to put the 1st cassette half into the loading condition.
On the monitor of the changer mechanism, the status of SW_F, SW_M, SW_R and encoder is displayed. The cassette mechanism can be placed in the normal operation.

Note : There is no guarantee for the changer mechanism. So, do not operate the changer operation.

2. TEST2 Mode (Sc, KEY4 Short)

The changer mechanism motor (O/C motor and LD motor) can be manually operated. This is the mode of resetting when the changer mechanism is locked. When the power is on, only the cassette mechanism is initialized. No changer mechanism initialization is made. But the monitor display is made, just as in the case of TEST1 mode.
These five accepting keys only are available :

FF KEY : Move the carrier rightward
REW KEY : Move the carrier leftward
FWD KEY : Move the tray forward
REV KEY : Move the tray backward
STOP KEY : Stop the motor

Monitor indication in the TEST1 and 2.

SW_R, M, F ENCORDER

8 when SW ON Turned off when OFF

3. Changer Mechanism Check Mode (Se, KEY2 Short)

Changer mechanism check and aging are performed. For motor protection, the motor should be forcedly stopped if the loading assist operation is not completed in 10 sec. At that time, it is possible to determine just where motor has been stopped based on the number of steps being displayed.
The check mode can be released by using the STOP key.

Display	Operation
S-1	Open
S-2	Close to 1st load
S-3	1st unload to 2nd load
S-4	2nd unload to 3rd load
S-5	3rd unload to 4th load
S-6	4th unload to 5th load
S-7	5th unload to 6th load
S-8	6th unload to 5th load
S-9	5th unload to 4th load
S-A	4th unload to 3rd load
S-B	3rd unload to 2nd load
S-C	2nd unload to 1st load
S-D	1st unload
S-E	Open
S-F	Close

Fig. 9-3

4. Skeleton Model Protection (Sa, KEY4 Short)

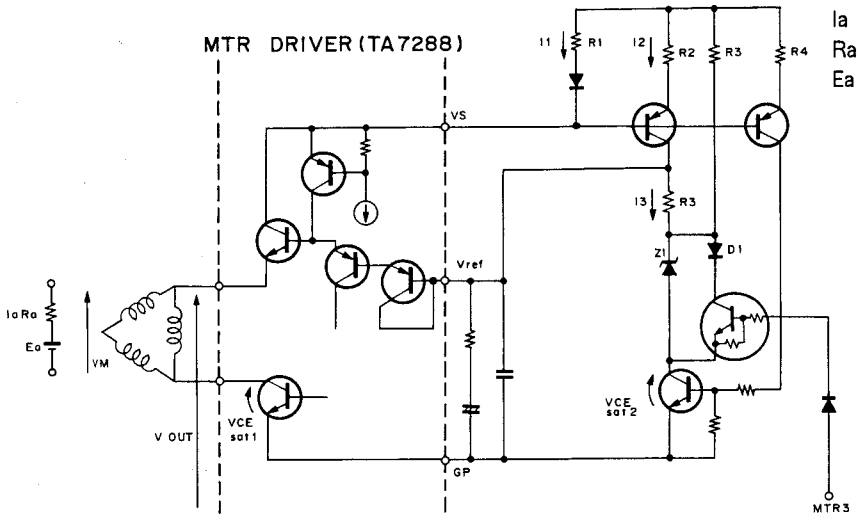
In the protection mode, the OPEN key is not accepted so as to avoid tape stealing at retail stores, but all the other is the normal operation. But when the power is on and the STOP key is kept on pressing, the protection mode is released so that the open key is accepted.

5. DEMO Mode

There is the 20-sec playback cassette random play mode is available as the DEMO mode. This mode can be selected by multiple pressing. Major differences of it from the cassette random play mode are that playback is for 20 seconds instead of one program playback and that the play is not terminated unless stopped by key-in operation.

①Select the TIMER PLAY mode.
②Select the ⇆ mode.
③Press the MUTE key and the REW key.
④Let go the MUTE key while holding the REW key.
⑤Let go the REW key.

9.8 O/C MOTOR AND LD MOTOR SPEED CONTROL CIRCUITS



Ia : Motor winding current.
Ra : Motor winding resistance.
Ea : Motor winding counterelectromotive force

Fig. 9-4

From IC data, the following relations are known.

$V_{OUT} = Vref + 0.7V = Vref + V_{BE}$ ..... (1)

So, when the internal circuit is assumed, the result appears as shown in Fig. 9-4.

This speed control circuit is designed to be $Vz \fallingdotseq Ea$. That is, the motor rotation speed is roughly determined by the Zener voltage. Therefore, the theoretical equation is as given below.

$V_{OUT} = V_M + V_{CEsat1}$

$= IaRa + Ea + V_{CEsat1}$ ..... (2)

$Vref = R_3I_3 + V_{Z1} + V_{CEsat2}$ ..... (3)

$I_2 = R_1/R_2I_1 = ※ KI_1$ ..... (4)

※K = Mirror ratio

$I_1 \fallingdotseq Ia$ ..... (5)

$I_2 \fallingdotseq I_3$ ..... (6)

From equations (4), (5), and (6)

$I_3 \fallingdotseq KIa$ ..... (7)

Substituting the equation (1) with the equation (2), then,

$IaRa + Ea + V_{CEsat1} = Vref + V_{BE}$ ..... (8)

Substituting the equation (8) with the equation (3),

$IaRa + Ea + V_{CEsat1} = R_3I_3 + V_{Z1} + V_{CEsat2} + V_{BE}$

$Ea = R_3I_3 - IaRa + V_{Z1} + V_{CEsat2} - V_{CEsat1} + V_{BE}$ ..... (9)

And substituting the equation (9) with the equation (7),

$Ea \fallingdotseq V_Z + V_{CEsat2} + V_{BE} - V_{CEsat1} - (Ra - KR_3)\ Ia$ ..... (10)

In the equation (10), assuming that V_{CEsat2}, V_{CEsat1} and V_{BE} are nearly constant, then the motor speed can be determined based on the Zener voltage in the first rule if the mirror ratio and R_3 are decided to be $Ra = KR_3$.

Speed Change

Z_1 is Zener diode for high speed setting and D_1 is diode for low speed setting.

When the microcomputer output, MTR3 are all "L", V_{Z1} is applied to the Vref pin of the driver IC along with the voltage drop $I_3 : R_3$ of the current detecting resistor R_3. And when MTR3 are "H", $2V_F$ voltage of D_1 is applied, respectively.

10. MECHANISM DESCRIPTIONS

DESCRIPTION OF CHANGER MECHANISM

The operation of the changer mechanism unit basically consists of a combination of the forward and backward operations of the tray section with respect to the front panel of the product and the lateral operation of the carrier section.

Tray Closing Operation

When the voltage is applied to the motor in such a way that the motor is rotated clockwise as seen from the rear of the bottom chassis, the motor rotation is sequentially transmitted to the motor pulley ①, O/C belt ②, pulley gear ③, interval gear ④, drive gear A ⑤, rack plate ⑥, and drive gear B ⑦, thereby causing the drive plate B ⑲ to be engaged with the drive gear B to be driven. (See Fig−1)

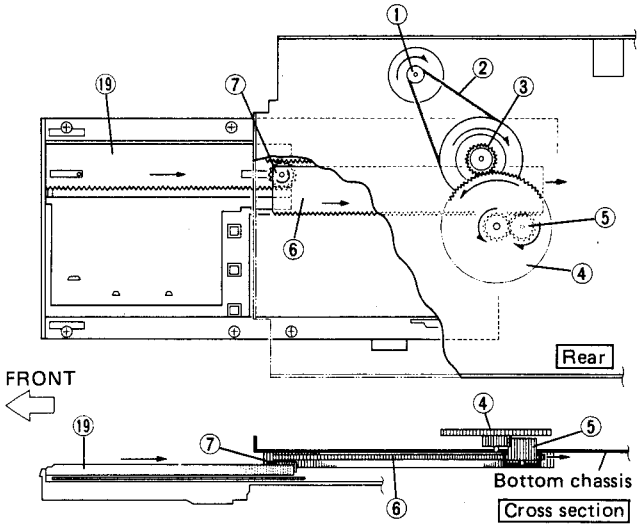


Fig.−1

Next, as shown in Fig−2, the drive plate B ⑲ pushes the ball A ⑱ and the ball A ⑱ which now have no place to escape drives the side rail R ⑯ in that condition. Since the side rail R ⑯ is assembled integrally with the tray base ⑮, the tray entirety operates in the closing direction. Then, the tray moves to the position where the rear bent side of the tray base ⑮ comes into contact with the stopper of the bottom chassis. After going past the load plate ⑬, at a position somewhat before it comes into contact with the stopper, the ball A ⑱ moves underneath at the concave portion A ⑭ of the bottom chassis. The drive force of the tray section has been detached at that time, and the protrusion ㉑ of the lower side of the drive plate B ⑲ only moves to the position where the SW lever ⑪ of the bottom chassis is turned on.

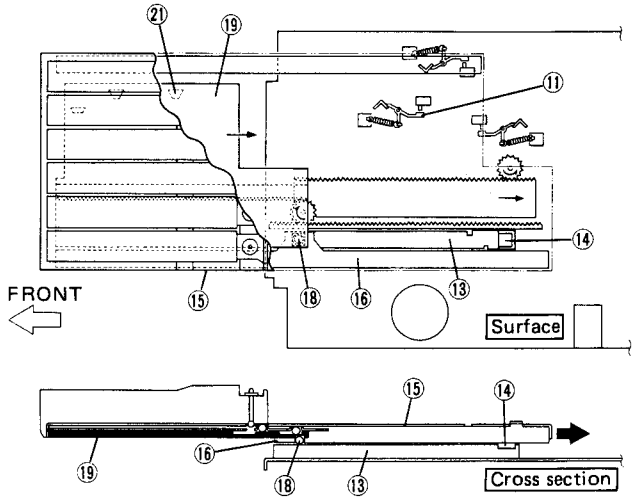


Fig.−2

Tray Opening Operation

The opening operation of the tray is just the reverse of the closing operation. First, the drive plate B ⑲ begins to move forward, causing the ball A ⑱ provided at the concave section A ⑭ to be pushed by the inclined side of the load plate ⑬ in the upper direction as shown in Fig−3. And the ball A ⑱ is pushed into the concave section B of the drive plate B ⑲. Now, the ball A ⑱ drives the side rail R ⑯ and the tray base ⑮. The tray section moves to the position where the protrusion ㉓ located at the lower part of the side rail L ⑰ causes the SW lever ⑩ to be turned on.

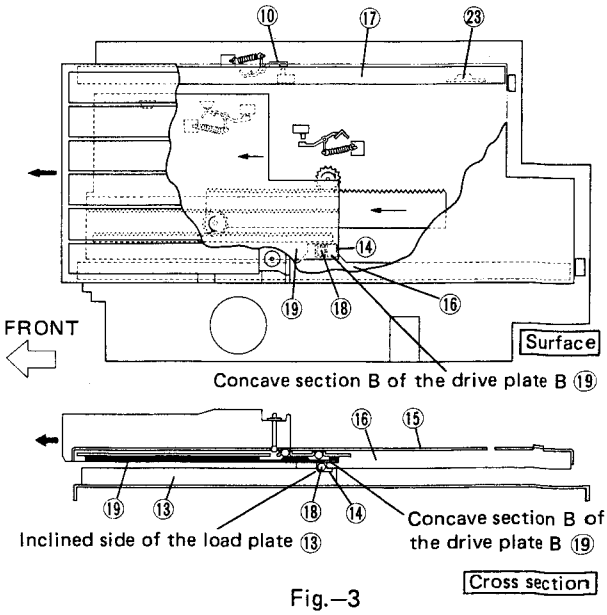

FRONT
Surface
Concave section B of the drive plate B ⑲
Inclined side of the load plate ⑬
Concave section B of the drive plate B ⑲
Cross section

Fig.−3

ON Operation of First Cassette Key (From the Tray Open State)

The operation from the tray open position to the close position is the same as described above. When the tray has moved to the close position (the SW lever ⑪ is turned on), the carrier section moves to the 1st cassette position from the cassette mechanism mounting position. The selector ㉕ is mounted in the carrier ㉔. Along with the movement of the carrier ㉔, the selector ㉕ moves to the first one of the cassette while sequentially pushing the head of the stopper pin ㊲. In this case, the location of position 6 of 1st cassette through 6th cassette can be electrically detected by the encoder ㉞ mounted on the carrier ㉔. The cassette mechanism mounted location can be detected by the microswitch ㊷ mounted on the carrier ㉔. (Fig−4)

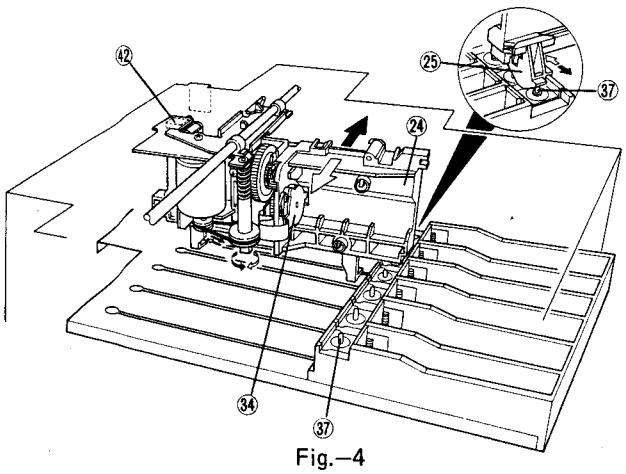


Fig.−4

Next, the voltage is applied to the motor, and the drive plate B ⑲ is further moved backward. After moving several millimeters, the ball B ㊸ is putted against the inclined side of the drive plate B ⑲, to drive the drive plate A ⑳ as shown in Fig−5. The cassette holder ㊱ mounted on the tray base ⑮ is normally locked by the stopper pin ㊲, but it is unlocked when the stopper pin ㊲ is pushed down by the selector ㉕. For this reason, the cassette holder ㊱ of the first cassette is already unlocked when the carrier ㉔ moved to the first cassette, and the tip−end of the stopper pin ㊲ lowered to the position where it comes into engagement with the hole a of the drive plate A ⑳. Therefore, the drive force of the drive plate B ⑲ is transmitted to the ball B ㊸, drive plate A ⑳, stopper pin ㊲, and cassette holder ㊱ in the order mentioned. The cassette half (cassette holder ㊱) and the selector ㉕ simultaneously move backward together with the movement of the drive plate A ⑳, and the cassette half now comes into the carrier section ㉔. The drive plate A ⑳ moves to the position where it comes into contact with the bent side of the tray base ⑮. (Fig−6)

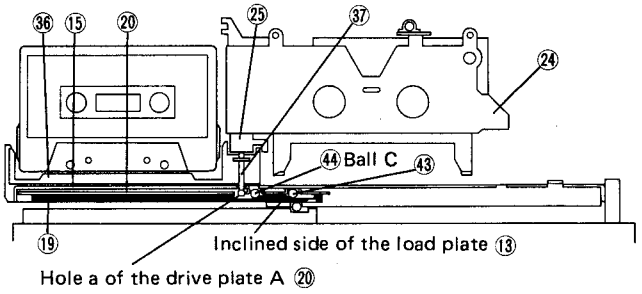


Fig.−5

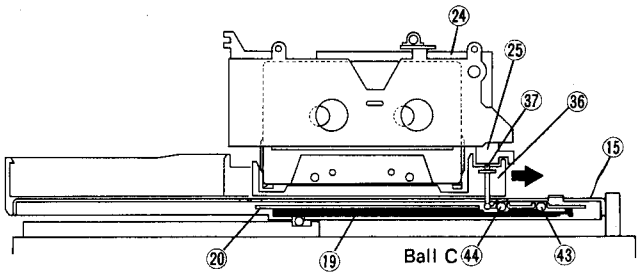


Fig.−6

The ball B ㊸ is lifted toward the concave section A ㊳ of the tray base ⑮ slightly before the above contact with the bent side takes place as shown in Fig−7. So, the drive plates A ⑳ and B ⑲ are disengaged from each other. The drive plate B ⑲ moves to the position where the protrusion ㉒ provided at the lower section causes the SW lever ⑫ of the bottom chassis to be turned on. (Fig−8)

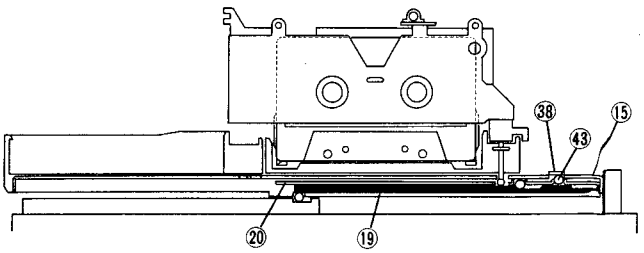


Fig.−7

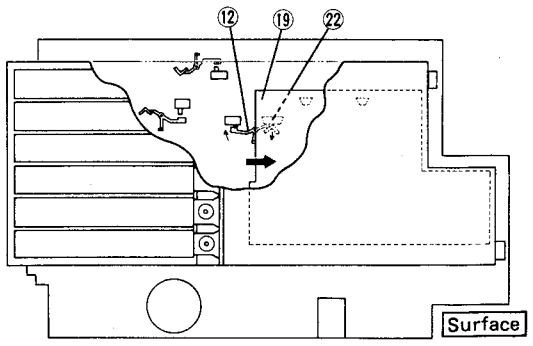


Fig.−8

Then, the carrier ㉔ moves to the cassette mechanism mounting position (where the microswitch ㊺ is turned on). In the mechanism mounting position, the cassette half is pressed to the carrier ㉔ by means of cassette pressure devices A, B ㊵. (Fig−9) Because the tray can be opened with the cassette half mounted in. In this case, the stopper arm ㊶ attached to the side of the cassette holder ㊱ under pressure of a spring rotates as shown in Fig−10 because the cassette holder ㊱ has already been moved to the back of the tray base ⑮ in the case of the tray for the first cassette. In this condition, the cassette half cannot be inserted in the first one as the cassette half is tilted, and the cassette does not come into the product in spite of tray closing operation, and does not be closed.

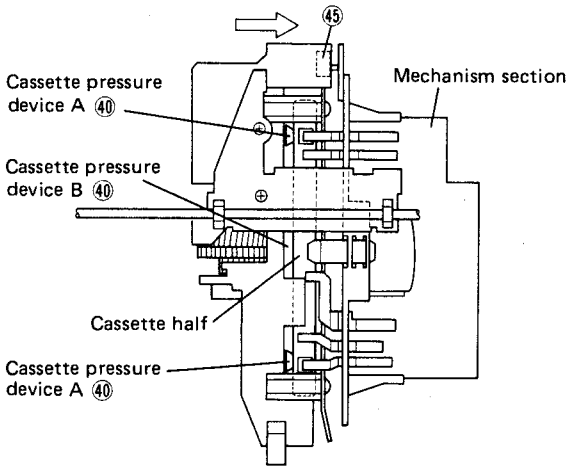


Fig.−9

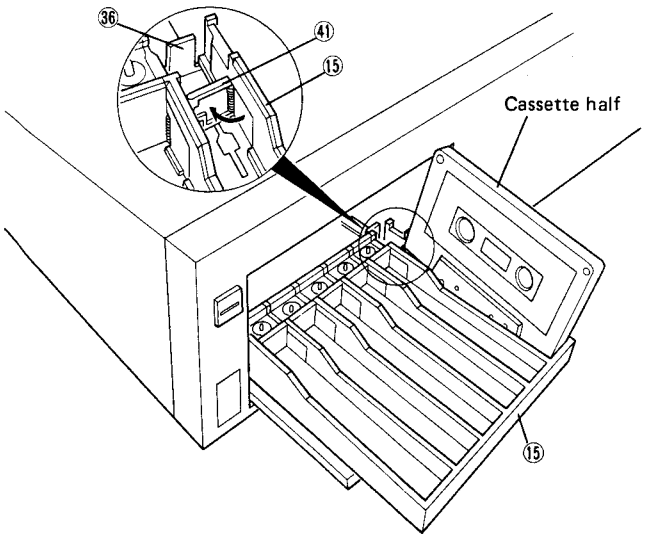


Fig.−10

Cassette Return Key ON Operation (1st Cassette Mechanism Mounted Condition)

First, the carrier section ㉔ moves to the 1st cassette position, which is just the reverse of the process in the cassette loading operation.
Next, the drive plate B ⑲ is driven in the forward direction. The selector ㉕ that has been moved to the back of the carrier ㉔ at that time comes into the cassette holder ㊱ while pushing the stopper pin ㊲ of the cassette holder ㊱. The tray base ⑮ is unlocked when pushed down by the stopper pin ㊲, to allow engagement with the drive plate A ⑳. (Fig−11)
Next, the drive plate B ⑲ is driven in the forward direction, the drive plate A ⑳ also begins to move forward as the ball comes into contact with the inclined side after moving several millimeters. Just as in the case of the cassette loading operation, the drive force is sequentially transmitted to the drive plate A ⑳, stopper pin ㊲, cassette holder ㊱, and selector ㉕. So, the cassette half and selector ㉕ moves toward the tray base ⑮. The drive plate A ⑳ moves until it come into contact with the bent side at the front area of the tray base ⑮. The ball is lifted to the recessed section B ㊴ of the tray base ⑮ slightly before it comes into contact with the tray base ⑮, the drive plates A ⑳ and B ⑲ are disengaged from each other. The drive plate B ⑲ moves to the position where the protrusion ㉑ of the lower section causes the SW lever ⑪ of the bottom chassis to be turned on.

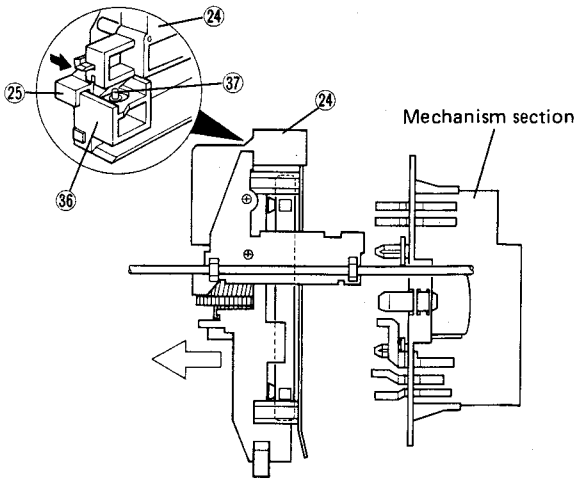


Fig.−11

Cassette Direct Change (2nd Cassette Key ON in the 1st Cassette Mounted State)

This operation is a combination of the afore−mentioned cassette loading operation and the cassette return operation.

11. DISASSEMBLY

REMOVAL OF LOADING UNIT (Refer to Fig−1.)

1. Remove seven screws ①, and remove the front panel assembly.
2. Remove six screws ② and cords, etc., and remove the loading unit.

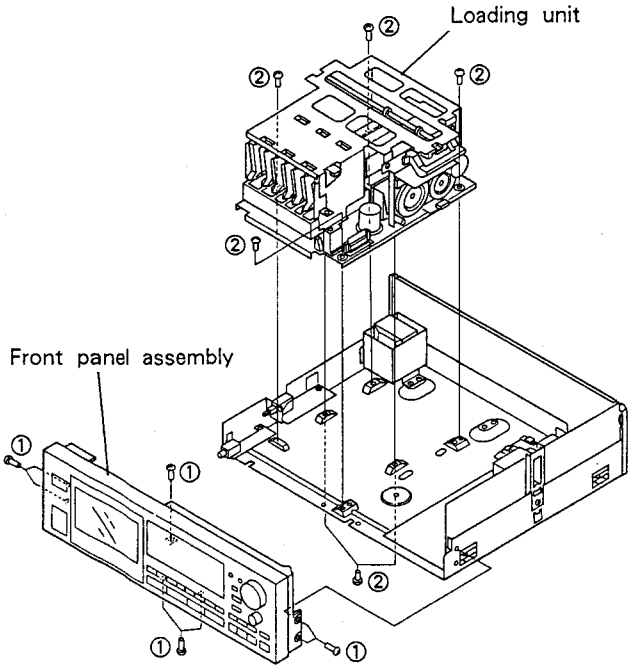


Fig.−1

REMOVAL OF MECHANISM UNIT (Refer to Fig−2.)

1. Remove two screws ① and two screws ②, and remove the mechanism unit while lifting the lower section up.

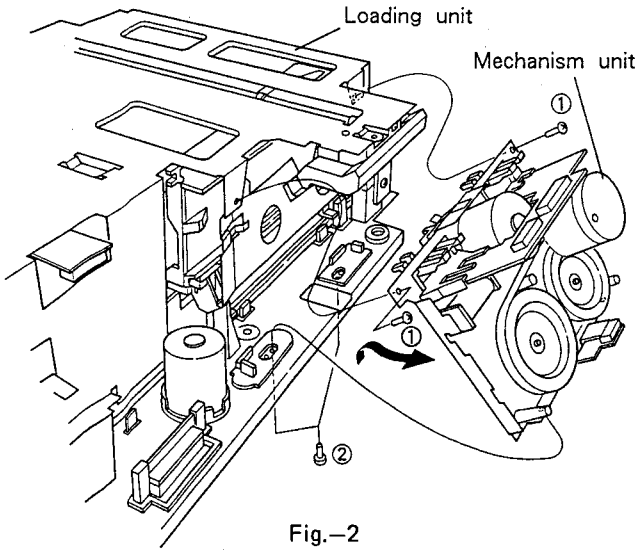


Fig.−2

Precautions on Installation

- When installing, lift the head base of the mechanism unit by fingers as shown in Fig−3 Ⓐ, and insert the mechanism unit slanting to upper. (Refer to Fig−8.)

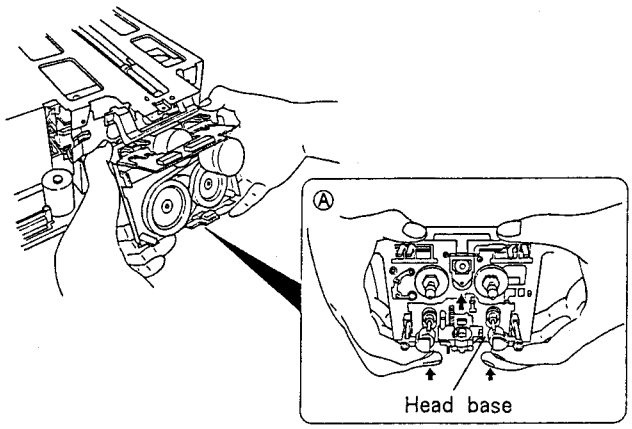


Fig.−3

REMOVAL OF TRAY ASSEMBLY (Refer to Fig−4.)

1. After checking that the carrier is pressed on the mechanism unit, turn the interval gear on the back of the loading unit clockwise and draw the tray assembly. While slanting the hook Ⓐ with fingers in the direction of arrow, draw the tray assembly again so that the hook Ⓐ is onto the stopper of the tray assembly. With this state, the tray assembly is removed, if draw it with pushing the hook Ⓑ on the opposite side of hook Ⓐ by slotted screwdriver, tweezers, etc.

   Note : Be careful not to lose the ball Ⓐ as it falls when the tray assembly is pulled out.

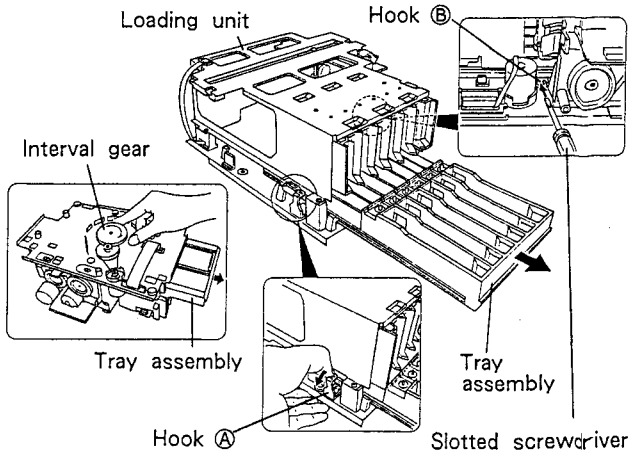


Fig.−4

REMOVAL OF DRIVE PLATE A AND B, CASSETTE HOLDER, STOPPER ARM AND TRAY

1. Remove two screws ① and two screws (1-a) (① longer than (1-a)), and remove the side rail R. And remove the drive plate A and B. (At this time, be careful not to loose the ball B and C as they fall.) Insert the slotted screwdriver between A and B of the drive plates as shown in Fig-5, and remove the hooks by pushing the drive plate B in the direction of arrow ⓐ, then remove the drive plate B as shown in Fig-5 Ⓐ.

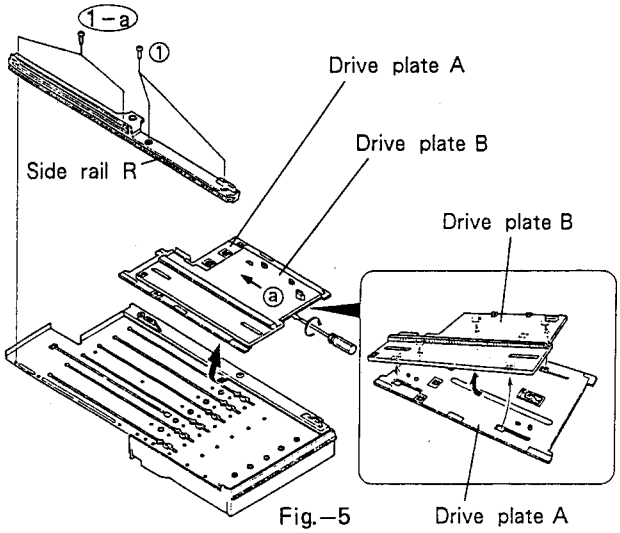


Fig.-5

2. Remove two screws ① and two screws (1-a), and remove the side rail L. While lowering the stopper pin with fingers, move all the cassette holders backward. Remove 10 screws ③, and remove the tray and stopper arms. (Refer to Fig-6.)

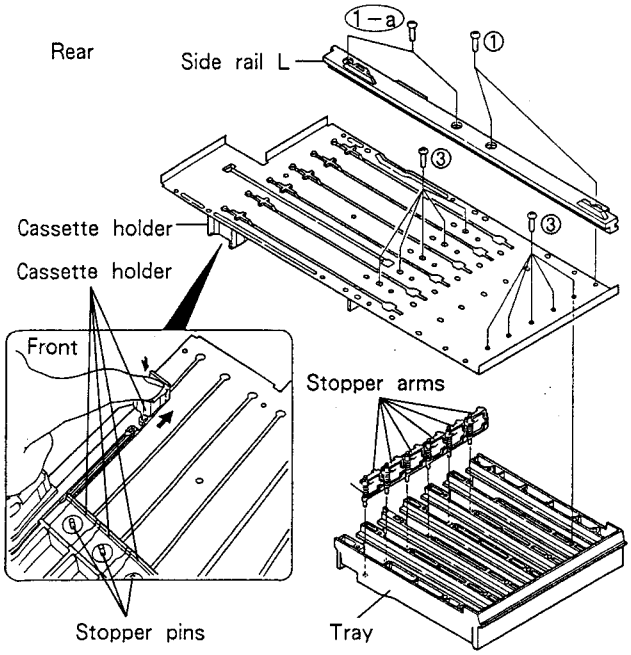


Fig.-6

3. While pressing the stopper pin, remove the cassette holders by moving it forward. (Refer to Fig-7.)

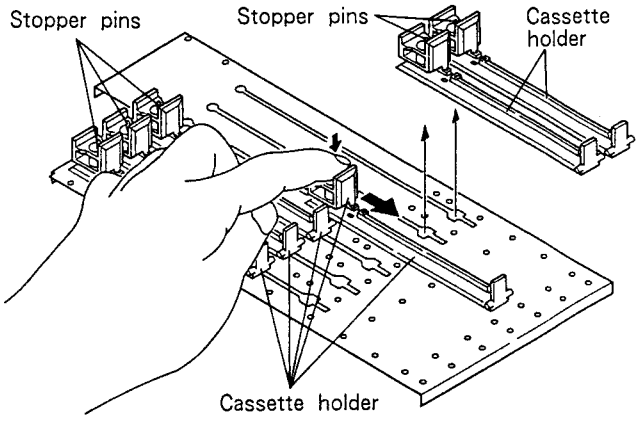


Fig.-7

Precautions on Installation

- When installing the stopper arms, hook the edge of the spring on the notch as shown in Fig-8 Ⓐ. And insert the longer shaft to the tray. This provides easy installation of the tray and tray base. When installing the tray and tray base, be sure that all bosses fit to respective holes and that the screw holes are not onto the tray base as shown in Fig-8 Ⓑ. Remove the springs of the stop arms from the notches by tweezers, etc. as shown in Fig-9. And press the stopper pins with finger so that all the cassette holders move forward.
- Be sure to install the balls A to C when installing the drive plate A and B, or the tray assembly.

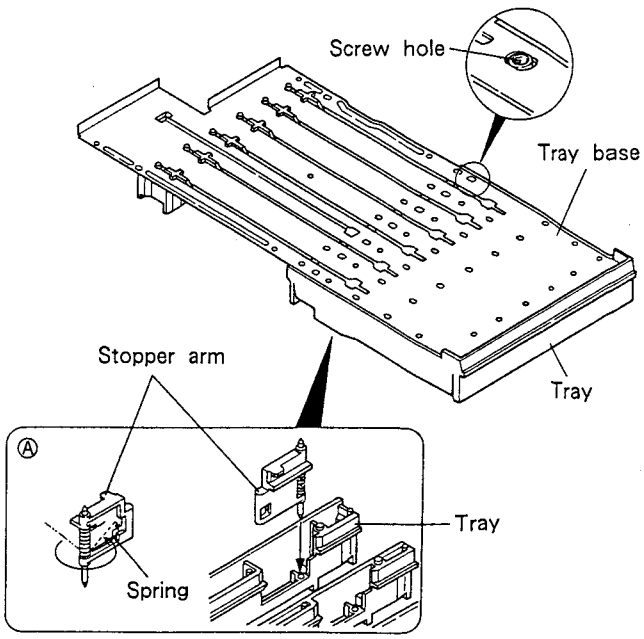


Fig.-8

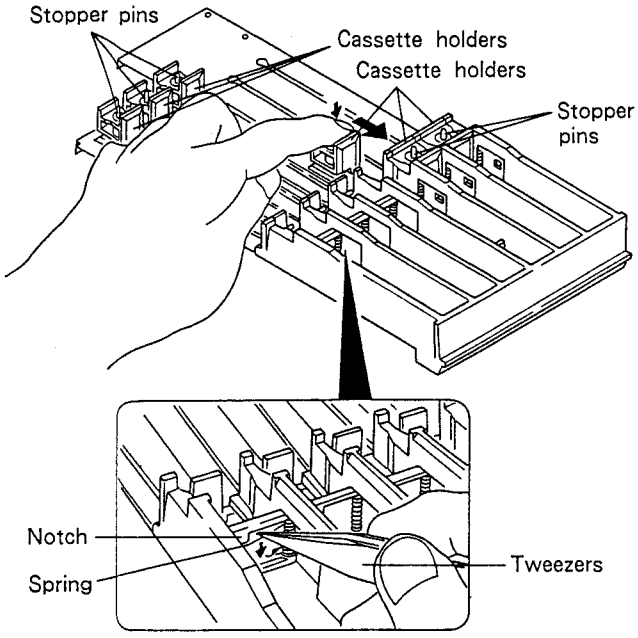


Fig.–9

REMOVAL OF UPPER CHASSIS (Refer to Fig–10.)

1. Since the carrier is pressed on the mechanism unit, turn the worm pulley with finger in the direction of arrow ⓐ to the position where the carrier plate of the carrier does not come into contact with the reel of the mechanism unit.
2. Remove four screws ① and two screws ②, and remove the upper chassis.

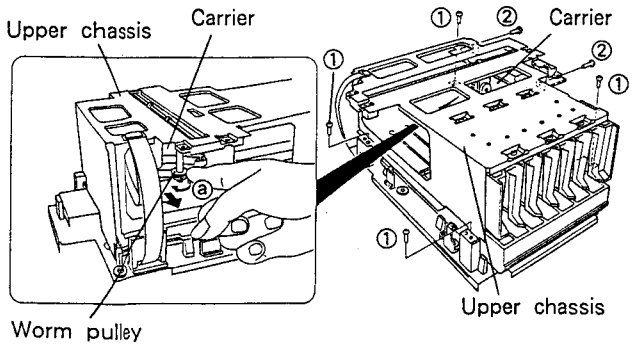


Fig.–10

REMOVAL OF CARRIER, ENCODER, ENCODER GEAR, DRIVE BELT, MOTOR AND LOADING GEAR

1. Remove the lead card from the connector, and remove the screw ①. And remove the carrier with guide shaft from the removed screw side. (Refer to Fig–11.)

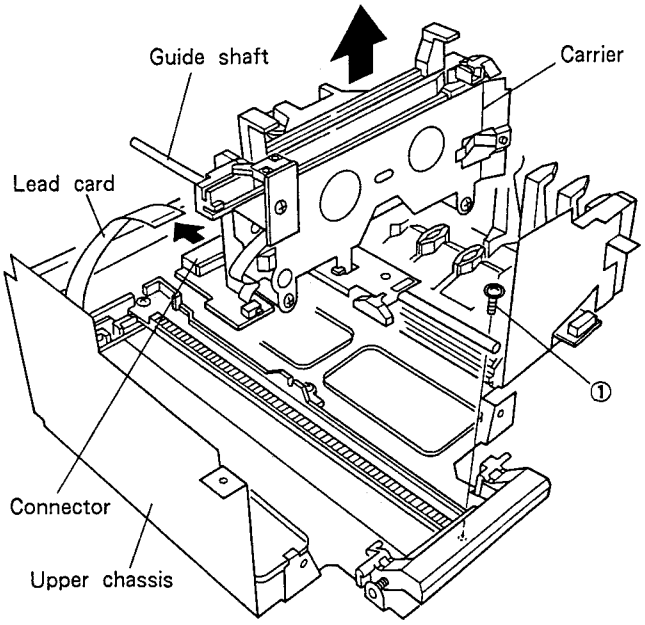


Fig.–11

2. Remove the screw ②, and remove the encoder by turning it clockwise. With this state, the encoder gear also can be removed. (Refer to Fig–12.)

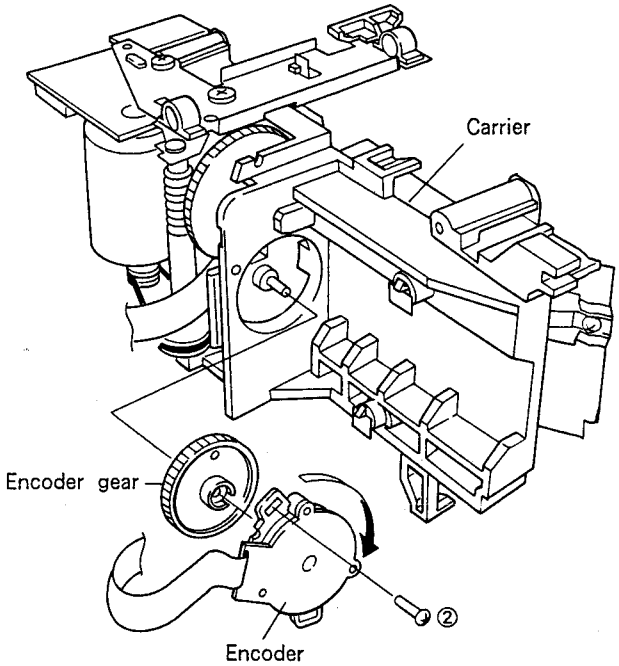


Fig.–12

3. Remove the drive belt from the motor pulley, and remove three screws ③, and then remove the carrier plate. (Refer to Fig−13.)

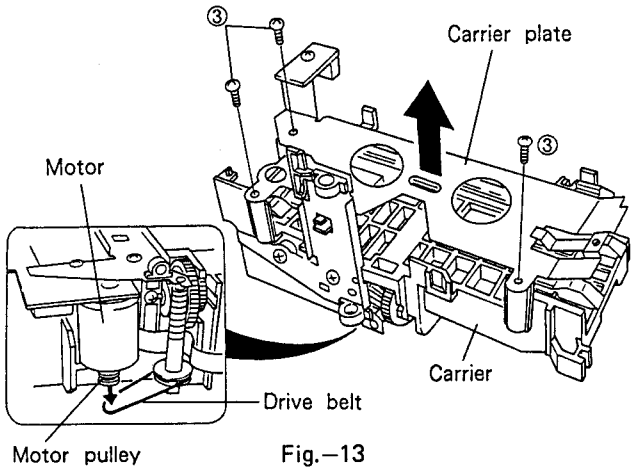


Fig.−13

4. Remove two screws ④, and remove the carrier slider. And the drive belt can be removed by removing the worm pulley. (Be careful not to stain the drive belt with grease at this time.) (Refer to Fig−14.)

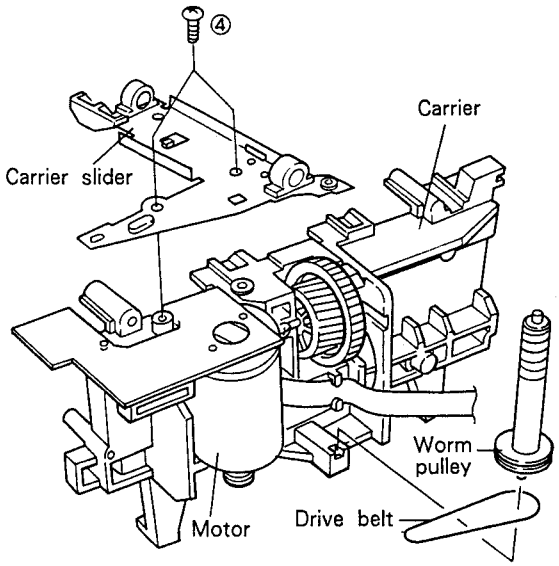


Fig.−14

5. Remove two screws ⑤ and desolder two sections (Fig−15 Ⓐ), and remove the motor. (Refer to Fig−15.)

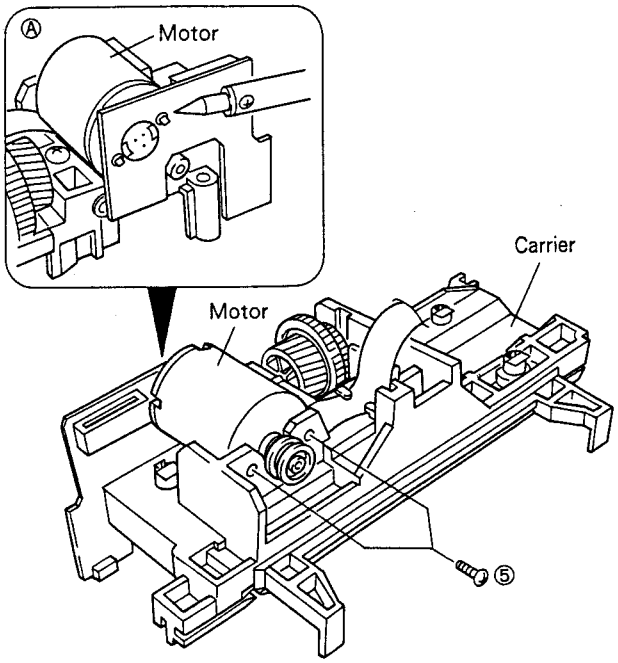


Fig.−15

6. Remove the screw ⑥, and remove the loading gear after pulling out the loading shaft with a pliers by pushing the upper of the loading gear with fingers. (Refer to Fig−16.)

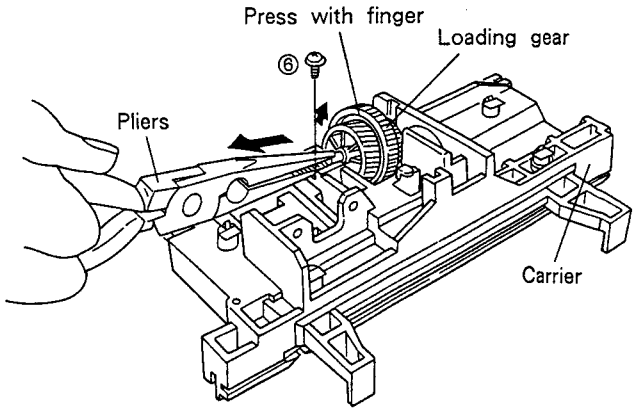


Fig.−16

Precautions on Installation

• Run the loading shaft through the loading gear as shown in the Fig−17, and insert to the carrier in the state of Ⓐ. And drive a screw after pressing the loading shaft with the tweezers, etc.

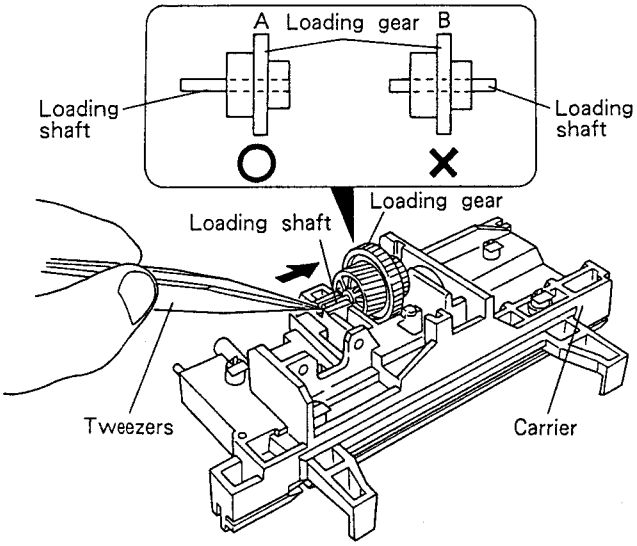
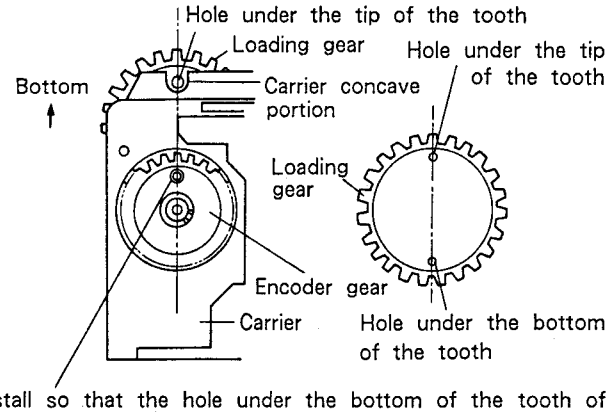


Fig.−17

• The following is the procedure to mount the encoder.

1. The holes inside the teeth of the loading gear are the state as shown in Fig−18, and match the hole under the tip of the tooth in two holes with the concave portion of the carrier. And install so that the hole of the encoder gear match with the hole under the bottom of the tooth of the loading gear. As shown in Fig−19 Ⓐ, after matching the convex portion of the encoder with ▼ mark, install the encoder by rotating itself in the direction of arrow while matching the screw hole with the concave portion of the encoder as shown in Ⓑ. Adjust the encoder position so that the left end of the encoder hole comes to the screw hole of the carrier as shown in Fig.−19Ⓒ, then fasten the screw. As shown in Fig−20, after assemble the carrier slider, etc., run the guide shaft through the carrier slider. Insert the guide shaft to section Ⓐ the upper rack while slanting it. And insert the slit of section Ⓑ of the carrier to section Ⓒ of the rib, and then, assemble so that the hole Ⓓ under the tip of the tooth of the loading gear matches with the notch portion Ⓔ of the upper rack.
   Mount the mechanism assembly, insert the cassette onto the first cassette tray for loading. At this time, confirm that the cassette is smoothly loaded through the center of the carrier.



Install so that the hole under the bottom of the tooth of loading gear watches with the hole of encoder gear.

Fig.−18

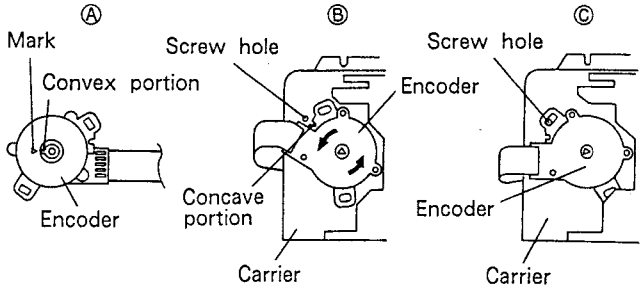


Fig.−19

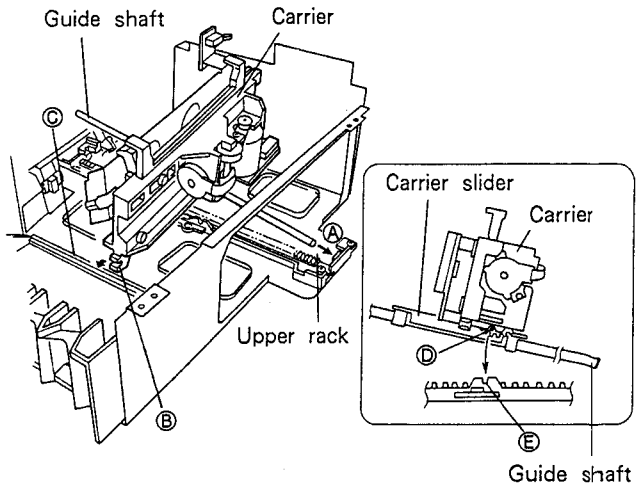
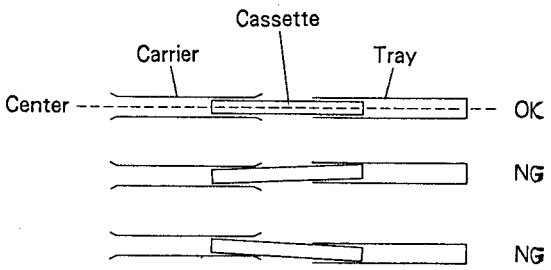


Fig.−20



REMOVAL OF UPPER UNIT

1. Remove the hooks of the upper holder, and remove six cassette arms. (Refer to Fig−21.)

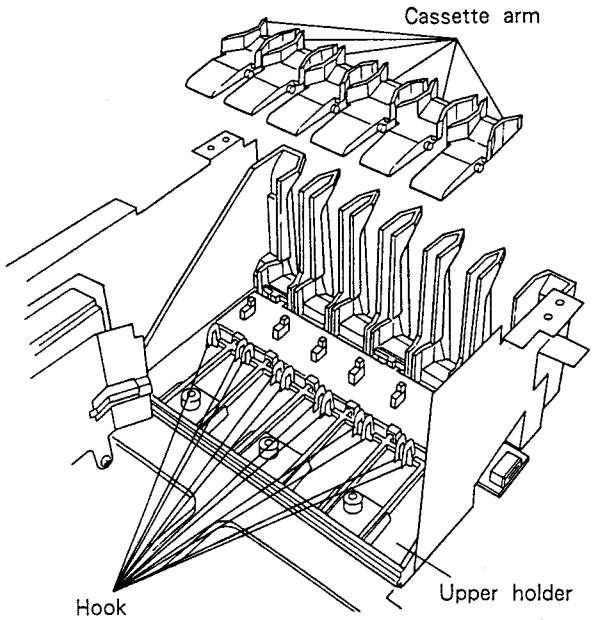


Fig.−21

2. Remove three claws, and remove the upper unit. (Refer to Fig−22.)

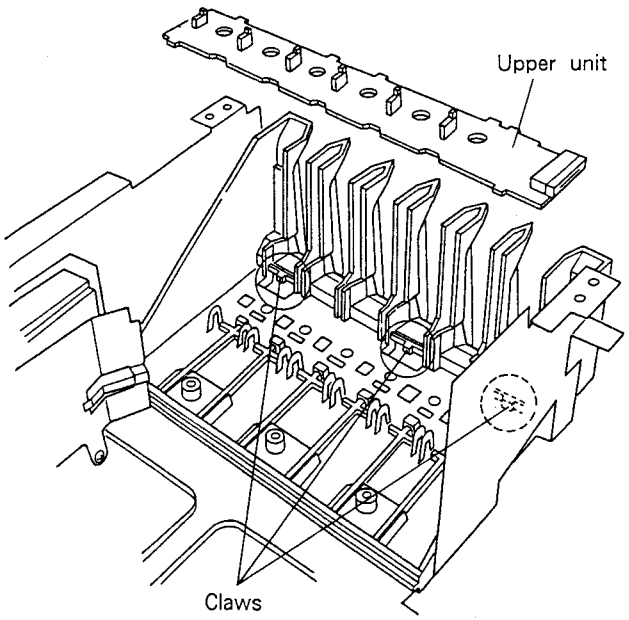


Fig.−22

REMOVAL OF TRAY−DETECTION SWITCH (Refer to Fig−23.)

1. Desolder six sections, and remove the switches respectively by removing the hooks of the switches.

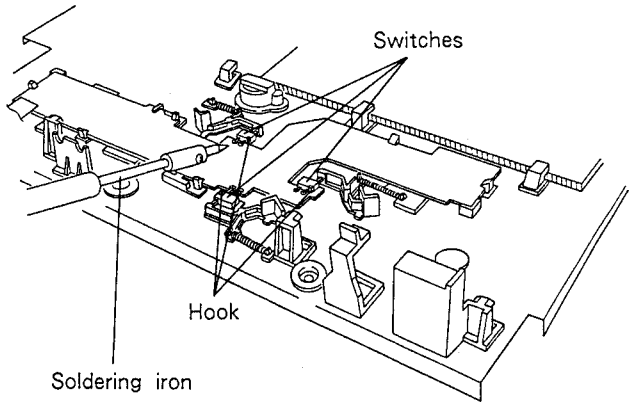


Fig.−23

REMOVAL OF PULLEY GEAR, INTERVAL GEAR, TIMING BELT AND DRIVE GEARS A AND B (Refer to Fig−24.)

1. Remove the O/C belt from the motor pulley.
2. Remove the polyslider washer ①, and remove the interval gear.
3. Remove the polyslider washer ②, and remove the pulley gear.
4. Remove the polyslider washer ③, and remove the drive gear A.
5. Remove the polyslider washer ④, and remove the drive gear B.

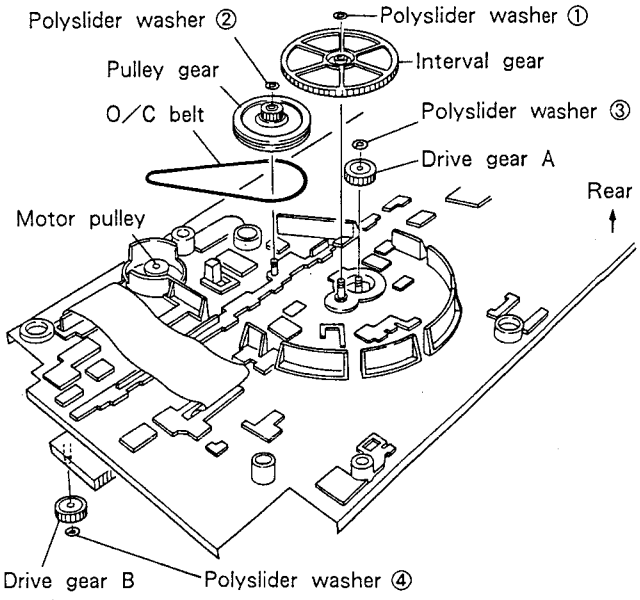


Fig.−24

Precautions on Installations (Refer to Fig–25.)

- When insert the tray assembly to the loading unit, match the third tooth of the rack of the bottom chassis with the shaft position of the rack plate.

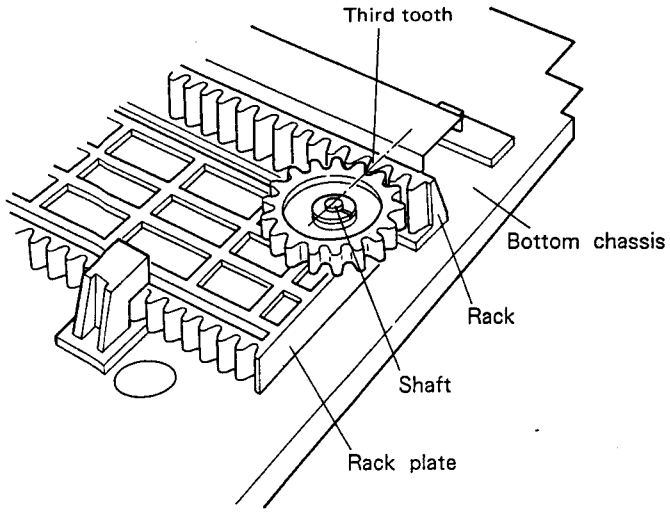
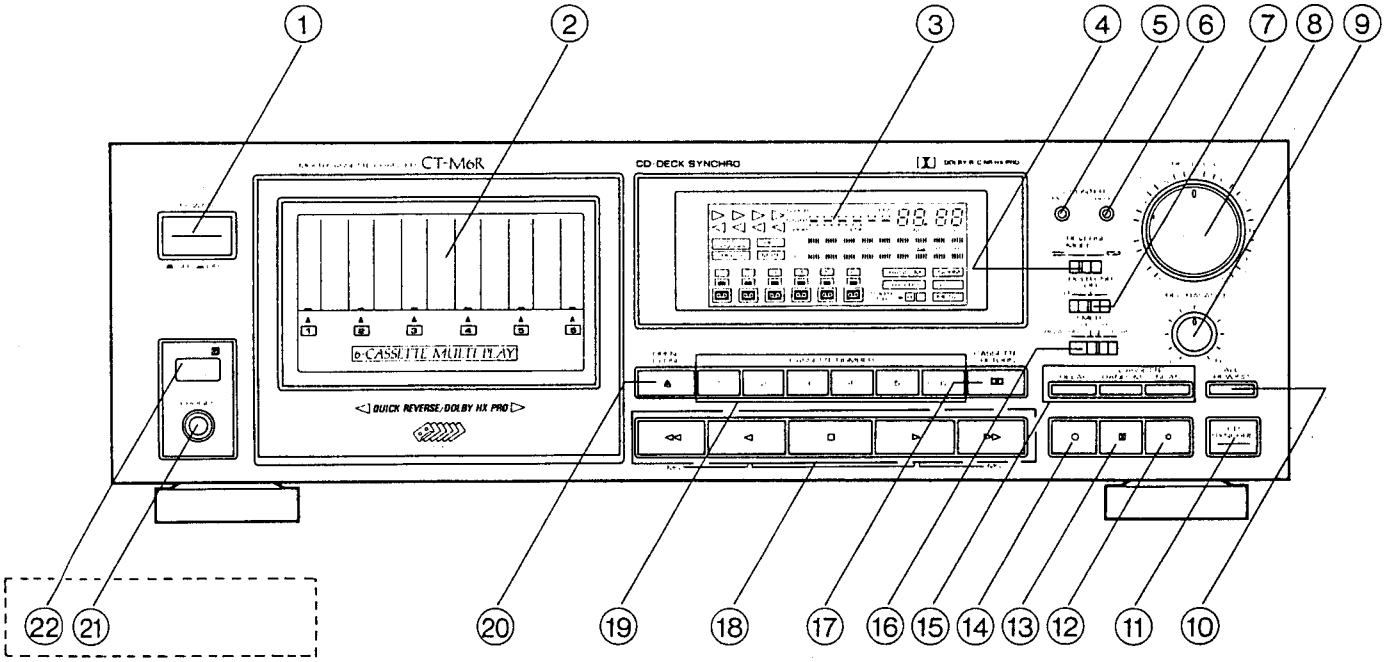


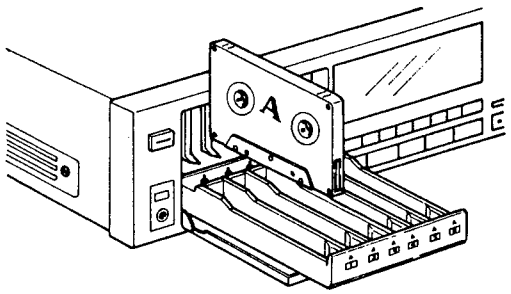
Fig.–25

12. PANEL FACILITIES



① **POWER switch**
Approximately 8 seconds after the POWER switch is pressed ON, the circuits become stable and operations can be carried out.

② **Cassette door and tray**
Press the OPEN/CLOSE button, and the door opens and the tray slides out. Insert the cassette so that the "A" side is on the left and the exposed (tape) side is facing down. When you press the OPEN/CLOSE button again, the tape tray will automatically close.
Tape counter display shows OPEN when the tray slides out.



NOTE:
If the tray is open and contains a cassette, cassette loading and the following operations can be carried out automatically without pressing the OPEN/CLOSE button:
▶ : Forward play, ◀ : Reverse play, SCAN, RANDOM and ALL REWIND buttons.

Caution: Place the cassette tapes correctly on the tray and do not place anything other than cassette tapes on the tray.

③ **Display window**

④ **REVERSE MODE switch**
Choose the tape transport mode.
⇄ : Tape transport stops after one side of a tape is played or recorded.
When the RELAY button is pressed, play or recording continues on the next numbered cassette until the highest numbered cassette is reached.
⇄ : During playback of the cassette you wish to hear, both sides of the tape are played back continuously until 16 sides have been played back.
In the record mode, both sides of the tape are recorded once and then tape transport stops.
When the RELAY button is pressed, after a cassette finishes, playback or recording continues on the next cassette until the highest numbered cassette is reached.

⑤ **COUNTER/MODE button**
Switches between the tape counter display and the time counter display.

⑥ **COUNTER/RESET button**
Sets the tape counter display to 0000 and the time counter display to 00.00.

⑦ **DOLBY* NR switch**
When in the recording mode, switch to B-type or C-type Dolby Noise Reduction, or to OFF.
When playing back Dolby NR-encoded tapes, always set this switch to the same position (B-type or C-type) used for recording.

*

- *Dolby noise reduction and HX PRO headroom extension manufactured under license from Dolby Laboratories Licensing Corporation. HX PRO originated by Bang & Olufsen.*
- *"Dolby", the double-D symbol ⧈ and "HX PRO" are trademarks of Dolby Laboratories Licensing Corporation.*

⑧ **REC LEVEL control**

⑨ **REC BALANCE control**

⑩ **ALL REWIND button**
Press this button to rewind all tapes automatically, starting with the lowest numbered tape on the tray. The counter display changes to " ALL " during this operation.
If the tray is open, it will automatically close by pressing this button.

⑪ **CD SYNCHRO button**
This button is used to carry out CD-Deck synchro recording from a CD player.

⑫ **Recording mute button (O)**
When this button is pressed during recording, the deck creates a 4-second blank space on the tape and then enters record-pause mode.
When you hold this button down, a continuous blank space is created until you release this button.

⑬ **Pause button (▮▮)**
Press this button when it is desired to temporarily pause playback or recording. Press the button again to resume playback or recording. The pause button cannot be used during fast-forward or rewind. Recording can begin when this button is pressed after pressing the recording (●) button.

⑭ **Recording button (●)**
When this button is pressed, the deck enters record-standby mode. Recording begins when the play ▶ (or ◀) button or pause (▮▮) button is pressed.

⑮ **CASSETTE control buttons**

RELAY: Press this button to relay record or playback the cassettes on the tray. (The RELAY indicator lights.)

RANDOM: Press this button to playback all cassettes on the tray in a random order. (The RANDOM indicator lights.)
The unit will stop when one side (in the ⇄ mode) or both sides (in the ⇆ mode) have been fully played back.

SCAN: Press this button to playback each cassette on the tray for about 10 seconds starting from the lowest numbered cassette. (Counter display changes to " SCAN ")

NOTE:
If a blank section is played back for approximately 15 seconds, the blank skip function will come into effect. The tape is automatically forwarded to the beginning of the next selection and then playback begins.

⑯ **TIMER switch**

RELAY REC: Set to this position for relay recording by timer.

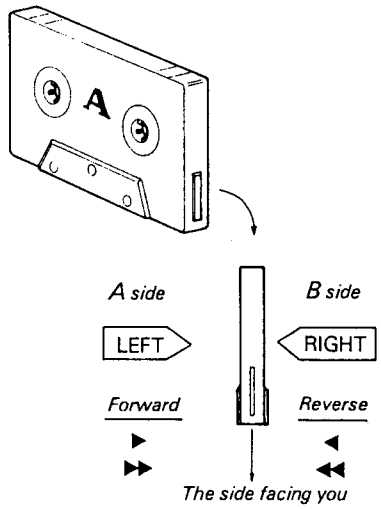
REC: Set to this position for a single cassette recording by timer.

OFF: Set to this position when not using the timer. (The switch should normally be set to this position.)

PLAY: Set to this position for playback by timer. Also set to this position for relay playback by timer with multiple cassettes.

⑰ **CASSETTE RETURN button**
Press this button to return the loaded cassette to the tray.

⑱ **Operation buttons**
NOTE:
Please keep in mind the illustration below to insure proper operation of your unit.



Fast-forward ▶▶:
When this button is pressed during stop mode, the tape is fast-forwarded in the direction of the arrows. When pressed during playback, the playback position skips forward by one selection for each press of the button (up to 15 selections), and playback resumes at the beginning of the designated selection.

Reverse play ◀:
Press this button to play back or record on the reverse side of the tape (the right side). (Reverse playback/recording)
Used to start recording in record-standby mode.
If the tray is open, it will automatically close and if a cassette is not loaded, the lowest numbered cassette will be loaded then playback will occur.

Stop ■:
Press this button to stop the tape transport.

Forward play ▶:
Press this button to play back or record on the forward side of the tape (the left side). (Forward playback/recording)
Used to start recording in record-standby mode.
If the tray is open, it will automatically close and if a cassette is not loaded, the lowest numbered cassette will be loaded then playback will occur.

Fast-reverse ◀◀:
When this button is pressed during stop mode, the tape is fast-forwarded in the direction of the arrows. When pressed during playback, the playback position skips forward by one selection for each press of the button (up to 15 selections), and playback resumes at the beginning of the designated selection.

⑲ **CASSETTE NUMBER buttons (1 ~ 6)**
Press one of these buttons to specify a cassette to be loaded from the tray.
Press one of these buttons and the Play (▶ or ◀) button to load a cassette and start playback.
Press one of these buttons and the recording (●) button to load a cassette and put in the record-standby mode.
Press one of these buttons and the fast forward (▶▶) or fast forward (◀◀) button to load a cassette from the tray and start fast-forwarding or rewinding.
If a play button (▶ or ◀) is pressed without one of these buttons, the lowest numbered cassette will be loaded and the operation will start.

⑳ **OPEN/CLOSE button (≙)**
When a cassette tape has been loaded, you can change the cassettes on the tray except for the loaded cassette number. Use the OPEN/CLOSE button to open and close the door.

NOTE: This deck cannot operate the cassette tray without the power switch at the ON position.

㉑ **PHONES jack**

㉒ **Remote Control Sensor Window**

13. SPECIFICATIONS

System ..... 4 track, 2-channel stereo
Heads ..... "Hard Permalloy" recording/playback head ×1
"Ferrite" erasing head ×1
Motor ..... DC servo motor (capstan) ×1
DC motor (reel, open/close, loading) ×3
Wow and Flutter ..... No more than 0.055% (WRMS)
No more than ±0.16% (DIN)
Fast Winding Time ..... Approximately 100 seconds (C-60 tape)

Frequency Response
−20 dB recording:
Normal tape ..... 20 to 17,000 Hz, ±6 dB
Chrome tape ..... 20 to 18,000 Hz, ±6 dB
Metal tape ..... 20 to 19,000 Hz, ±6 dB
Signal-to-Noise Ratio
Dolby NR OFF ..... More than 58 dB

Noise Reduction Effect
Dolby NR B type ON ..... More than 10 dB (at 5 kHz)
Dolby NR C type ON ..... More than 19 dB (at 5 kHz)

Harmonic Distortion ..... No more than 1.0% (0 dB)
Input (Sensitivity)
LINE (INPUT) ..... 63 mV (Input impedance 50 kΩ)
Output (Reference level)
LINE (OUTPUT) ..... 316 mV (Output impedance 5.8 kΩ)
Phones ..... 0.25 mW (Load impedance 8 Ω)

Subfunctions
- DOLBY NR B/C types
- DOLBY HX PRO
- Music search over ±15 selections
- CD-Deck synchro recording capability
- Tape counter/Time counter
- Tape Remaining Time indicators (6 seg)
- FL peak level meter (8 seg + ∞)
- Automatic space recording mute
- One-touch recording pause
- Automatic tape selector
- Automatic reverse (Quick reverse)
- Phones jack
- TIMER Recording/TIMER RELAY Recording/TIMER Playback
- System remote control compatible
- Relay recording/Relay playback
- All rewind
- Cassette random playback
- Cassette scan playback

Miscellaneous
(CT-M6R)
Power Requirements ..... AC 120 Volts, 60 Hz
Power Consumption 25W
Dimensions ..... 420 (W) × 136 (H) × 372 (D) mm
16-9/16(W) × 5-3/8(H) × 14-5/8(D) in
Weight (without package) ..... 7.5 kg (16 lb 9 oz)

Accessories
Operating instructions 1
Connection cord with pin plugs 2
CD-Deck synchro control cord 1
System remote control cord 1
Remote control unit 1
Dry cell batteries "AAA" [IEC-R03 (UM-4)] 2

NOTE:
Specifications and design subject to possible modifications without notice due to improvements.